The Facts about

Electrical Controls for Fork Trucks

...and what they mean to you

YOU'VE BEEN HEARING many impressive sounding phrases such as "*automatic acceleration*," "*full contactor control*," "*non-plugging controllers*," etc., used by electric industrial truck salesmen to describe their controls. Some of you have asked us "What do these features mean to me in terms of performance and operating costs?"

Here are the Simple Facts:

Twelve years ago Baker recognized that careless operators were damaging trucks and loads by making "jack-rabbit" starts. Often motors were burned out by the high surges of current resulting from this abuse. The sudden jolting of loads frequently caused them to fall off the forks.

Even greater damage was caused by "truck jockeys" who jammed controls into full reverse while travelling forward in high speed. This is called "plugging" the motor, and is just about as disastrous and costly to the truck as it would be if you tried it on your car.

So, in 1940, Baker engineers attacked the problem of *controlled acceleration* to combat "jack-rabbit" starts. Trucks at that time all used drum controllers which cut out resistance in the circuit as the speed lever was advanced.

Baker Introduces Contactor Control

One of the first apparent improvements pioneered by Baker, was *contactor control.*

The contactor has many fingers which open and close to bring resistance in and out of the power circuit. A brief delay between the closing of each contact is required to provide smooth acceleration. On some electric-powered machines, dash pots, filled with graduated amounts of air, govern the closing of a bank of contactors to gain the desired effect.

For industrial truck purposes, however, we found that this system required more technical maintenance skill than was available in the average user's plant. Chief sources of trouble were fouling of the dash pots and the continued arcing as fingers opened and closed.

Obviously, a better method was needed to provide time delay. Baker then called in leading electrical experts and with their help developed a contactor with magnetically controlled time delay. This was a vast improvement, but the contactor still presented a complex maintenance problem. So, in 1943 Baker set out again.

Baker Rejects Full Contactor Control

As an alternative to contactor control, Baker engineers devised an ingenious acceleration circuit for the drum controller that required the operator to start in first speed and remain there for the split second required to stabilize current in the motor and get the truck rolling gradually and smoothly. *The truck could start in no speed but first.*

Tests proved satisfactory, so Baker moved to the next problem—"motor plugging" or immediate reversal of controls.

Baker Develops Dynamic Braking

Our engineers then designed a dynamic braking circuit which, when controls are reversed, brings the truck to a smooth stop before it reverses the current. This system uses the inertia of the truck to turn the motor—which, during deceleration, becomes a generator supplying current to prevent the reversing circuit from going into action.

The net effect is like shifting your car into second as against reverse, if you wish to slow down.

Dynamic braking is invaluable as an auxiliary brake on steep grades. *No other industrial truck manufacturer offers it as standard equipment.*

* * *

Now, to come back to the question "What does this mean in terms of performance and operating costs?"

Just this: Baker now provides simple and positive methods of *controlled* acceleration and deceleration. This means safer handling of loads and less wear and tear on truck and motor.

Other manufacturers, it is true, make similar claims. But they still employ full contactor control—with its staggering maintenance costs. We know: we pioneered the contactor system now in common use—only to abandon it for something better.

This is another example of the user-benefits researched and engineered by *Baker*, the oldest name in electric vehicles.

For a copy of a new 8-page booklet on Baker features and equipment, write for Bulletin 54.

The Baker-Raulang Co.
1251 West 80th St. · Cleveland 2, Ohio

For more facts circle 502 on Reply Card

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Published Monthly by
Technical Publishing Co.
110 S. Dearborn St., Chicago 3, Ill.

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Phone: Atwater 7401

Subscription Information — Published Monthly
Prices: United States and Possessions one year $10.00, Canada one year $11.00. Other countries one year $12.00. Single copies $1.00.
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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

See You at the Maintenance Show

PLANT ENGINEERING will have a booth at the Plant Maintenance Show and Conference, at the Public Auditorium in Cleveland, from January 19th through 22nd. Anyone who wishes to is welcome to stop in for a bit of relaxation or a chat with the editors.

Stop in and see us. The booth number is 504.

Ventilation Conference at MSC

THE SECOND Annual Industrial Ventilation Conference will be held at the Kellogg Center on the Michigan State College campus, February 16-19.

The course will be devoted to the practical application of exhaust systems for the control of industrial contaminants. Those attending will have a choice of working out in small groups, each group aided by an experienced engineer acting as instructor.

There will also be talks and demonstrations by experienced field men on such subjects as duct design, fans, selecting air tempering units, plus other interesting subjects.

For additional information on registering for this course, readers should contact K. E. Robinson, Consulting Ventilation Supervisor, Division of Industrial Health, Michigan Dept. of Health, Lansing 4, Michigan.

Personnel Change at Scaife

Carl E. Johnson, a veteran of 19 years' service as engineer at Scaife Co., Oakmont, Pennsylvania, has been appointed chief engineer. His new responsibilities will include engineering functions in connection with all new products and processes, and plant improvements, as well as supervision of all engineering activity for the present line of the company's products.

Bakery Equipment Maintenance Course

A COURSE IN bakery equipment maintenance was recently conducted at the American Institute of Baking. This special course was given at the request of bakery firms concerned over mounting costs, waste of man-hours and of ingredient loss affected in the breakdown of equipment.

In addition to the classes on specific repair and care problems, related subjects were discussed including Principles of Electricity, Job Scheduling, and Personnel Problems. Members of the Department of Bakery Sanitation gave lectures on the influence of bakery sanitation standards on proper maintenance of equipment.

The course lasts six days, covering a series of from 5 to 7 lectures each day, supplemented by demonstrations and tours. The course will be repeated during the week of March 16 to 21, 1953. Those interested in attending, should contact the American Institute of Baking, 400 E. Ontario St., Chicago 11, Ill.

New Plants Going Up

Rheem Manufacturing Co. is now operating in its new shipping container plant located at Linden, New Jersey . . . **Westinghouse Electric Corp.** is building a lighting fixture plant in Vicksburg, Mississippi, and a meter plant at Raleigh, North Carolina . . . **Caterpillar Tractor Co.** is building a plant at York, Pennsylvania, which will utilize Eastern steel sources and be in a better position to supply replacement parts to Eastern and European outlets . . . **Aluminum Co. of America** has already begun production at its newest aluminum smelting plant at the Rockdale Works, Texas . . . **General Electric Co.** is now manufacturing fractional-horsepower motors at its new plant at Linton, Indiana.

Students Will Design Motors

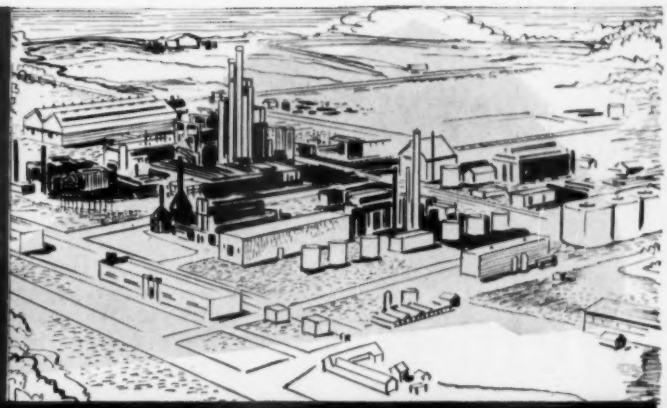
ELECTRICAL ENGINEERING students at Case Institute of Technology, Cleveland, next February for the first time will have the opportunity to enroll in a new motor design course wherein their own design efforts will actually be incorporated into manufactured motors. Normally such design courses are limited to "paper work" that cannot be checked by actual tests for performance and manufacturing practicability.

Under this new plan, small groups of students will work together in designing motors from one to 7½ hp. Their specifications will then be

(Continued on page 6)

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

A STEAM TRAP CASTS A MIGHTY BIG SHADOW!



THINGS STEAM TRAPS AFFECT	REASON	HOW ARMSTRONG TRAPS MEET THE NEED	EXAMPLE
1 HEAT-UP OR START-UP-TIME	When steam is turned on, large amounts of condensate and air must be removed.	Condensate and air are discharged as fast as they reach trap.	*40 Minutes Faster* Heat-up of drying oven at pharmaceutical plant with Armstrong "Blast" traps.
2 RATE OF PRODUCTION	Quick heat-up, maximum temperatures essential for maximum output.	Air and condensate discharged at steam temperature; equipment kept full of hot, dry steam.	*30% Greater Output* from jacketed kettles at Canadian plant since changing to Armstrong traps.
3 STEAM WASTE	When steam gets past traps, fuel is wasted, boiler capacity may be inadequate.	No steam ever reaches discharge orifice, even when there is no condensate load. Heat treated chrome steel valve parts, ground and lapped, resist wear, stay leak-tight for a long time.	*Steam Savings Eliminate Need for New Boiler* at chemical plant since installing Armstrong traps.
4 FUEL WASTE	Steam that blows through traps does no useful work, wastes fuel.		*33⅓% Reduction in Fuel Bill* after trapping vats with Armstrongs at Missouri plant.
5 CONTINUITY OF OPERATION	When traps are inoperative or down for repairs, unit being drained may be "off the line."	Nothing to clog, stick or collapse! Large orifice. Self-scrubbing action cleans out dirt, scale. "Frictionless" leverage, heavily reinforced. Wear and corrosion-resistant stainless trim.	*Maintenance Time Cut* 30% Illinois user says, "Unequalled dependability, simplicity of design means repairs can be made quickly" (with minimum equipment downtime).
6 MAINTENANCE COST	Traps that don't "wear well" take a lot of manhours for repair.		

BIG effects from little traps! And, the effects are multiplied by the number of traps in the plant you design or operate until they grow to be a major influence upon operating efficiency and economy.

Before you specify steam traps ask your nearby Armstrong Representative to call. He is qualified to give you practical assistance and answers that can save you a lot of time and trouble.

SEND FOR CATALOG

The 44-page Armstrong Steam Trap Book gives complete data on trap operation, selection, installation, maintenance, safety factors, etc. Free on request . . . Write:

ARMSTRONG MACHINE WORKS • 912 Maple St., Three Rivers, Mich.

ARMSTRONG STEAM TRAPS

For more facts circle 503 on Reply Card

BUILT FOR YEARS
OF HARD WORK AND ABUSE—

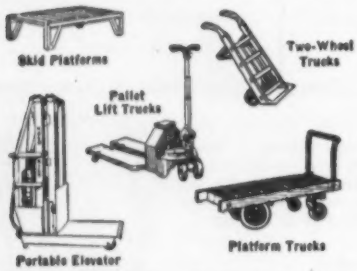
Weld-Bilt

HYDRAULIC
LIFT-TRUCK

Here is a hydraulic lift truck that can "take it and deliver" year in and year out, with hardly a thought to maintenance. It's Weld-Bilt.

One of the many reasons for Weld-Bilt's longer service life is the exclusive HORIZONTAL MOUNTING of the hydraulic unit. This vital unit is protected from danger of daily knocks and bumps. And this unit is interchangeable — it can be replaced after years of service to add still longer life and utility to the truck.

In their capacity range of 2,500 to 10,000 pounds, there's a Weld-Bilt Hydraulic Lift Truck to fit your needs exactly. Write for catalog, details or engineering consultation on the COMPLETE Weld-Bilt Line.



WEST BEND
EQUIPMENT CORP.
MATERIALS HANDLING
ENGINEERS
304 N. Water Street, West Bend, Wis.

For more facts circle 504 on Reply Card

Students Will Design Motors

(Continued from page 4)

sent to Robbins & Myers, Inc., Springfield, Ohio, where the motors will be built at no charge. The company will then deliver the motors to Case where the students may check their work by making actual tests that are rarely, if ever, possible in normal classroom procedure. The motors will become the property of Case as an adjunct to their regular laboratory equipment.

Catalog File for Plant Engineers

DISTRIBUTION of a new collection of more than 250 manufacturers' catalogs compiled especially for plant engineering men is now in progress, according to C. L. Williams, General Manager of Sweet's Catalog Service.

Known as Plant Engineering File, this new bound collection of catalogs, totaling 1,924 pages of buying information, covers a wide range of materials and plant equipment used in the maintenance of all plant facilities and services to production. This new File is being distributed free of charge to 30,000 offices in selected manufacturing organizations.

Wanted: Info on Safety Devices

A LIBRARY OF information is being accumulated by the Pressed Metal Institute on safety devices for presses and other related equipment.

This information will be used to set up a library to aid the Institute's Safety Committee and will also be used to inform members on specific safety devices when such inquiries are received.

All producers of equipment and devices having application in a pressed metal fabricating shop are invited to submit full data regarding their products. Data should include a clear description of the safety feature or features and if possible a glossy photograph of the unit or device, and any other factors dealing with efficiency and low maintenance. Information should be sent to Pressed Metal Institute, 2860 East 130th St., Cleveland 20, Ohio.

Quality Control Reduces Steel Production Costs

QUALITY CONTROL by statistical methods, which has not been extensively applied in the steel industry until recent years, is now being used to effect savings in the cost of production, as well as to improve the uniformity of finished steel products. In a talk by Wade R. Weaver, Republic Steel Corp., at a recent technical meeting of American Iron and Steel Institute, he also cited several examples of how steel companies reduce production costs through adjustments of variations in production.

In one case a steel company saved several thousand dollars a month in return for a few hours of statistical analysis on a slight variation in the average silicon content of steel being manufactured into plates. At first the difference appeared insignificant but it was found that 40 per cent of the heats from one furnace were below the desired minimum on silicon but only 15 per cent from the other furnace. As a result of a change in deoxidation practice, the yield of slabs from ingots was increased 2.7 per cent.

In another example, a chart of the variations in the thickness of plates was found valuable when made available to men in charge of rolling the steel. This chart helped the roller to avoid or correct pronounced variations in the thickness of the steel plates.

'ROUND ABOUT

Amino Promotes Plant Engineer

A. E. Roeske was recently appointed to the newly created position of division plant engineer at Amino Products Div. of International Minerals & Chemical Corp.

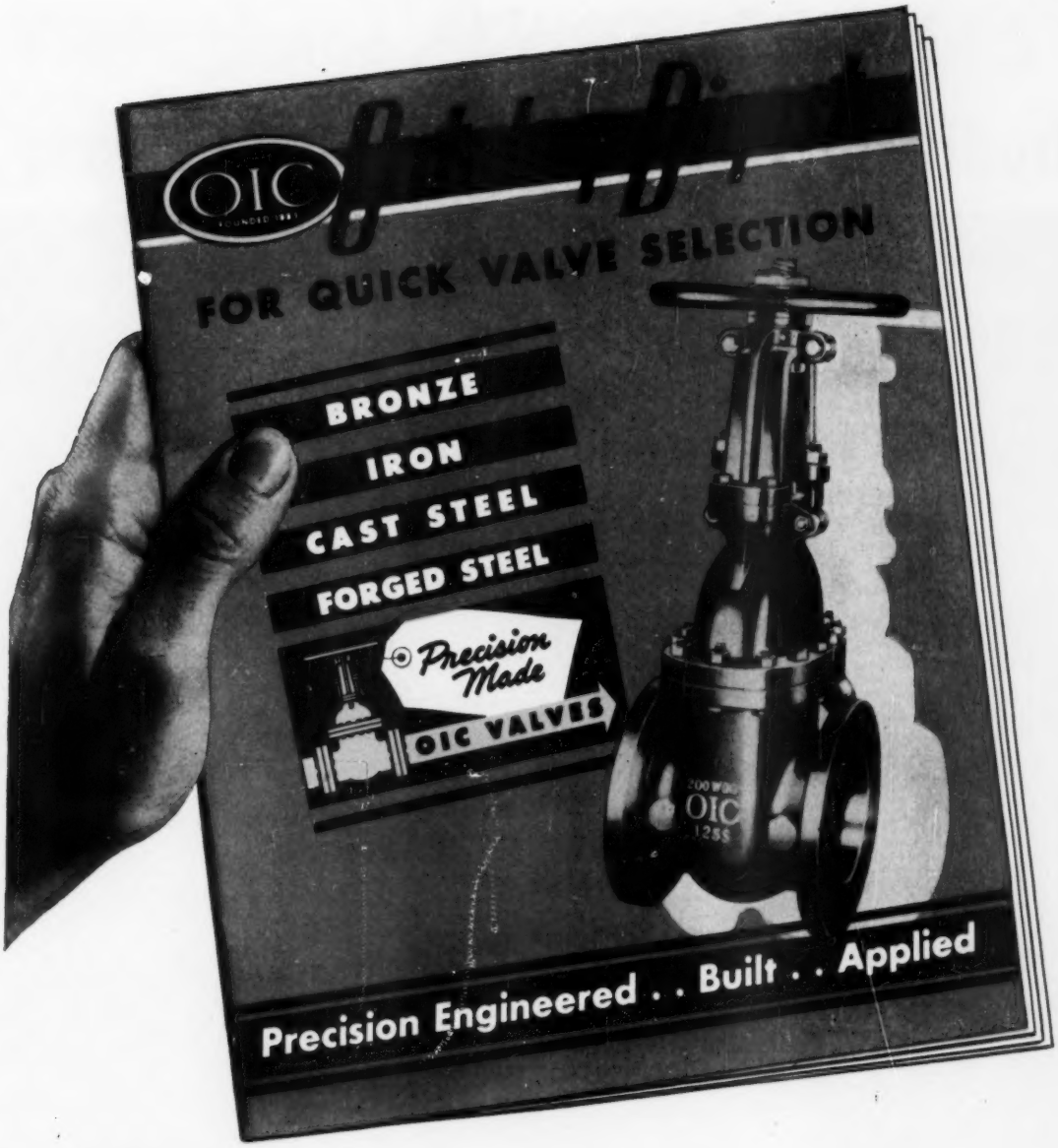
He has been plant engineer at the San Jose plant since 1947. In his new position, Mr. Roeske will functionally supervise all maintenance work in the plants of the division, and all minor construction jobs. He will also be available to act as project engineer in connection with new construction. In addition to these duties, he will also retain the responsibilities of plant engineer at the San Jose plant.

Course in Materials Handling

A TWO DAY "Materials Handling Short Course" will be given at Georgia Tech, on January 29th and 30th.

The short course will provide lectures, demonstrations and discussions on the following topics: determining the most economical handling method; increasing storage capacity; reducing accident, inventories and processing; selecting equipment; materials handling communications; and improving the materials handling layout. The charge for this course is $35.00 per person which includes all course materials. Enrollment is limited to 45.

Readers wishing to make reservation or desiring more information may contact C. H. Taylor, Coordinator, Engineering Extension Division, Georgia Institute of Technology, Atlanta, Georgia.



FREE..to valve users and buyers

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Please send me a copy of the new booklet, "OIC Catalog Digest for Quick Valve Selection".

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Company_____

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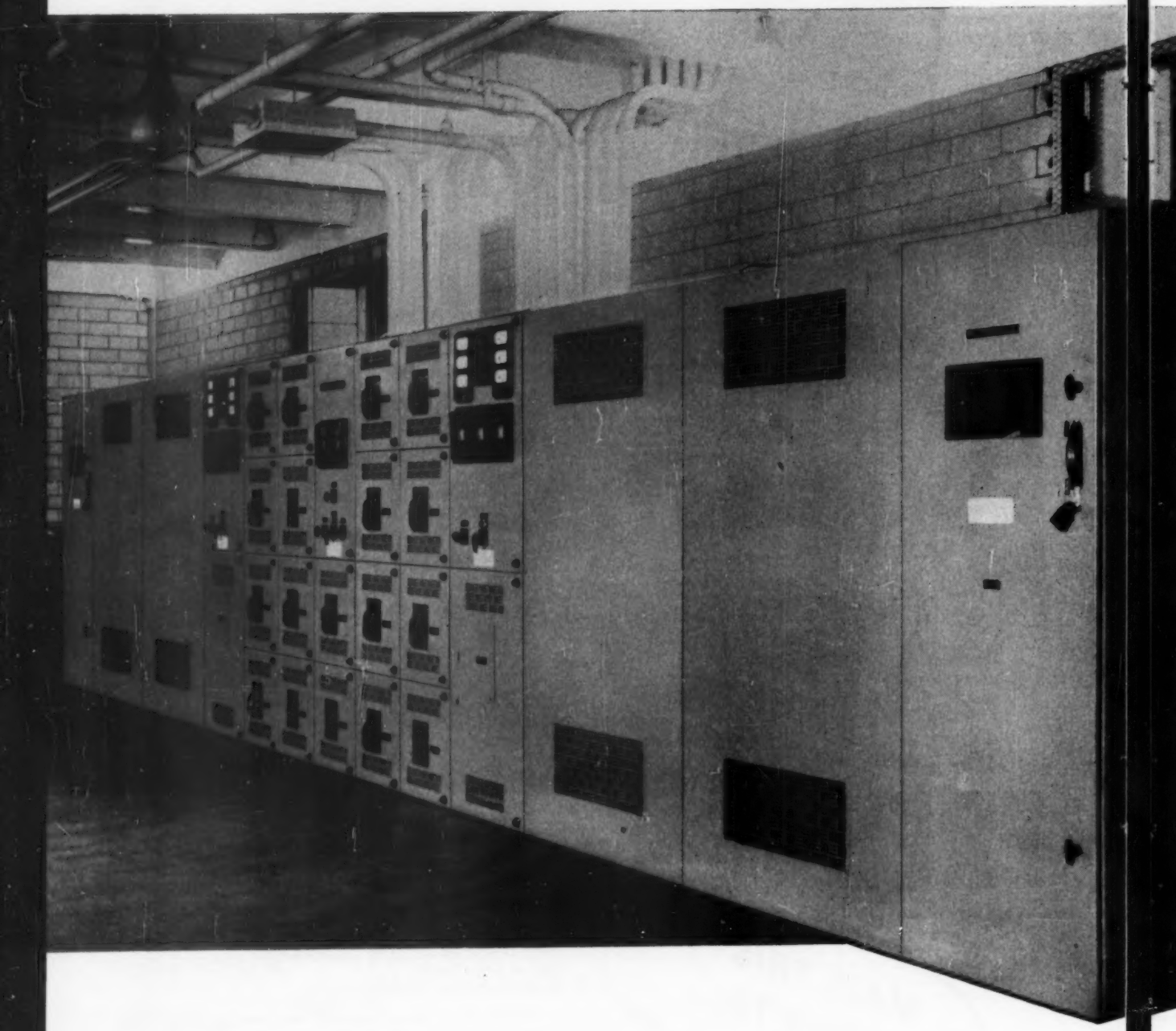


Westinghouse *POWER CENTERS* provide for efficient power distribution at Eastman Kodak

Westinghouse Power Centers consisting of dry-type transformers and switchgear are serving the modern power distribution system at Eastman's Kodak Park Works at Rochester, N. Y. Here's how this user rates their performance in this key function.

> *"In recent years, a number of Westinghouse Power Centers have been installed at the Kodak Park Works. These units all have ASL dry-type transformers and are supplied at either 2,400 or 13,800 volts. Capacities range from 300 kva to 1,500 kva. Maintenance has been nominal and no serious trouble of any kind has been experienced. We are well satisfied with the equipment."*

Many specific advantages of Westinghouse Power Centers contribute to such approval of these installations. For example . . .

They cost less to maintain . . . no liquids to test, recondition or replace . . . no gaskets, valves or gauges. All parts are readily accessible.

They're more economical . . . because they eliminate the need for costly vaults and can be located near the center of load . . . resulting in shorter secondary circuits, lower line losses, better regulation.

They're safer . . . from the hazards of fire and explosion; they have no exposed live parts. Breakers and switches have positive interlocking mechanisms, each in its separate compartment.

GET THE COMPLETE STORY

Westinghouse Power Centers provide better service continuity, greater flexibility, better regulation . . . all the things that contribute to efficient power distribution. Most important, they provide the simplest, lowest-cost way of attaining the power system that best meets your operating requirements.

Booklet B-4162 covers Westinghouse Power Centers in detail. Booklet B-4045 discusses various types of plant distribution systems wherein power centers offer maximum advantage. Contact your Westinghouse Representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-60765

YOU CAN BE SURE...IF IT'S Westinghouse

POWER CENTERS

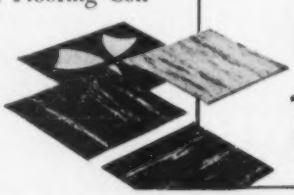
For more facts circle 506 on Reply Card

What can the company president learn from mopping the floor?

HE'D LEARN that even floors that look alike can be vastly different . . . in their ability to withstand dirt, stain and wear.

He'd quickly find out that a floor well suited for his office would be a poor choice . . . *a waste of money* . . . in the staff's basement locker room or the cafeteria.

And, he'd learn to call on the expert services and trained knowledge of the Kentile Flooring Contractor . . . a man fully qualified to survey his flooring needs and recommend the one floor that is best . . . most economical . . . for every installation.



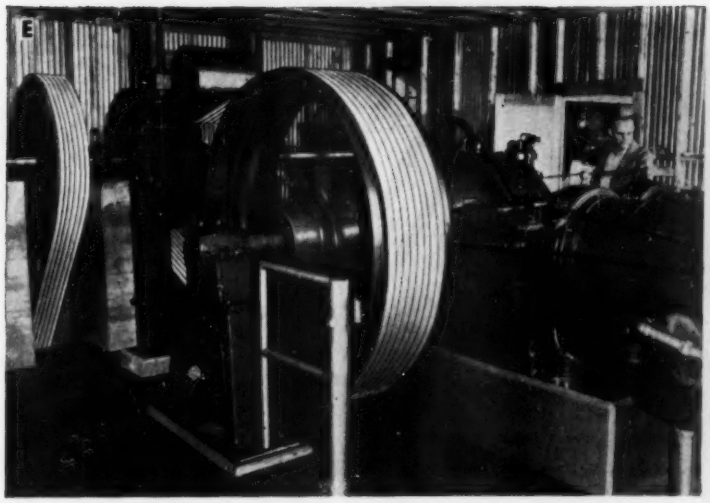
Call the Kentile Flooring Contractor* for up-to-date information about these floors

- ✓ KENTILE ASPHALT TILE
- ✓ KENRUBBER TILE FLOORS
- ✓ KENCORK FLOORS & WALLS
- ✓ SPECIAL greaseproof KENTILE

KENTILE INC.

*If you don't know the name of your Kentile Flooring Contractor look under FLOORS in your Classified Phone Directory or write Contract Dept., Kentile, Inc., 58 2nd Ave., Brooklyn 15, N. Y.

For more facts circle 507 on Reply Card



An extremely compact layout is made possible by the use of these Gates Vulco Rope Drives at the Bivins, Texas, plant of the Breakenridge Gasoline Company. The drives connect an engine with a line shaft driving cooling water and still circulation pumps.

Why a V-Belt with Concave Sides Wears Longer...

—Just try this yourself!

Pick up *any* V-Belt and bend it as if it were going around a pulley. As it bends, grip its side between your fingers and thumb. Here is what you will feel—*every time.*

If the V-Belt has *straight sides,* you feel those sides *bulge out.* This forces the sides of the belt to press *unevenly* against the V-Pulley and you naturally get *concentrated* wear along the bulge —as shown in figure 1-A, below at right.

Now, try this same test with the belt that is built with CONCAVE SIDES—the Gates Vulco Rope!

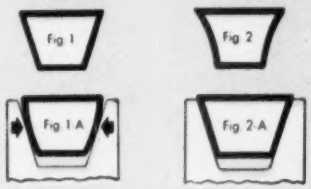
You find that the CONCAVE SIDES fill out and become perfectly straight. The sides press *evenly* against the V-Pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means *longer* belt *life* and *lower* belt *costs* for you.

The CONCAVE SIDES of Gates Vulco Ropes (U. S. Patent No. 1813698) clearly give you (1) Less wear, (2) More pulley contact, (3) More sure power transmitted when needed!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in the Sheave-Groove. Sides Press Unevenly Against the V-Pulley, Causing Extra Wear at Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in Sheave-Groove. No Side-bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-5211

V-Belts — Hose
Molded Rubber Goods
for industry
World's Largest Maker of V-Belts

Gates® VULCO ROPE DRIVES

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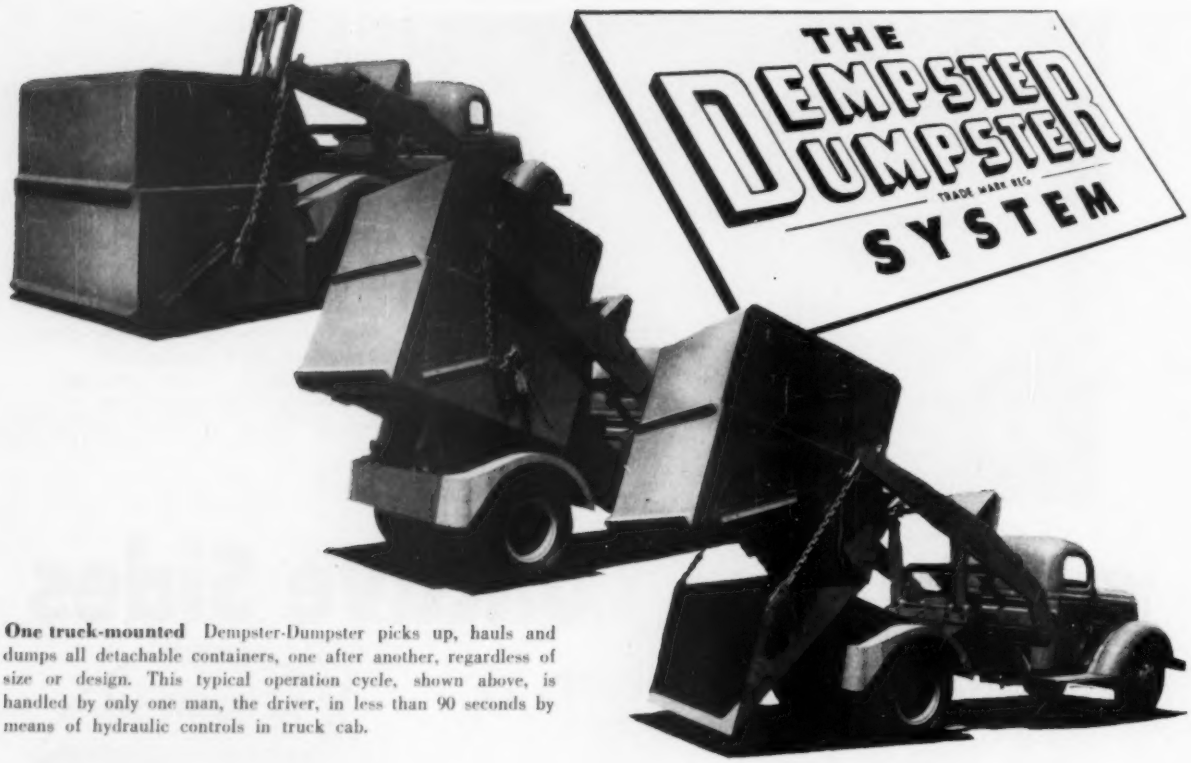
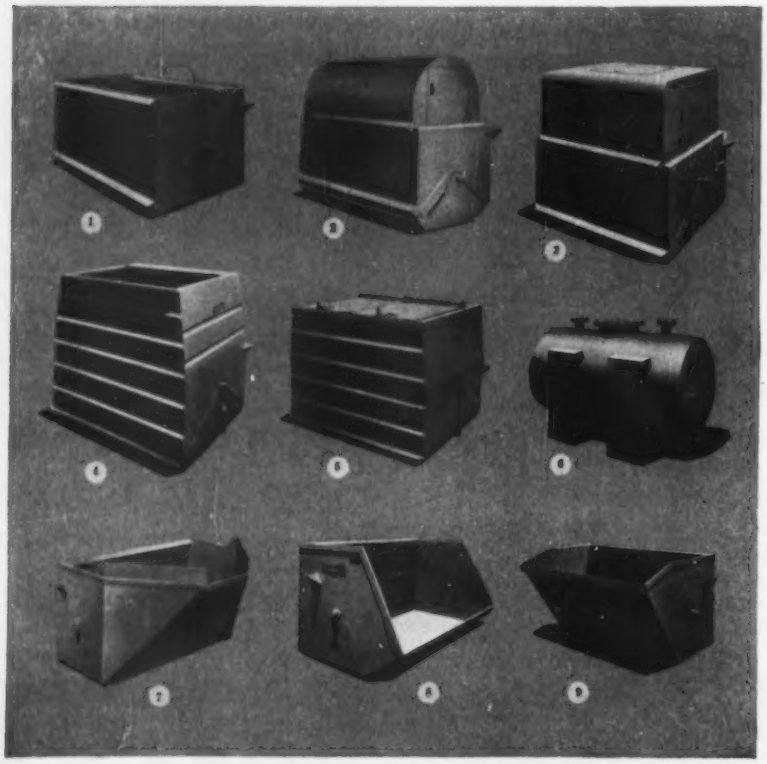


One truck-mounted Dempster-Dumpster picks up, hauls and dumps all detachable containers, one after another, regardless of size or design. This typical operation cycle, shown above, is handled by only one man, the driver, in less than 90 seconds by means of hydraulic controls in truck cab.



1—Cuts Cost of Equipment and Operation— It is not unusual for one Dempster-Dumpster to perform the work of from 3 to 5 conventional trucks . . . reducing investment accordingly. Eliminating trucks also means eliminating tires, gas, oil, maintenance and man hours.

3—Eliminates Re-Handling of Materials — Re-handling of materials, which by conventional methods are hand loaded by loading crews into dump trucks, is eliminated. Each detachable container remains at its convenient location until loaded. Then, in less than a minute, it is picked up by Dempster-Dumpster and taken to destination. There it is dumped or set down intact . . . saving hundreds of man hours annually.

• • •

At left are a few standard containers for general requirements— 1—Drop Bottom Container built up to 10 cu. yd. capacity to handle heavy materials. 2—Apartment Type for bulk trash and rubbish with sump bottom for handling moist materials. 3—Universal Type available with top and end doors. 4—Drop Bottom Pressed Steel Type for lighter service. 5—Drop Bottom Pressed Steel Type with counterbalanced spring lids. 6—Tank Type Container meeting A.S.M.E. specifications. Capacities up to 1,200 gallons. 7—Tilt Type with Converged Lip for handling fine aggregate, wet or fluid materials. 8—Skip Type with Lip to assist in holding certain types of loaded materials in place. 9—Tilt Type for handling heavy materials. Built water-tight.

D E M P S T E R B R O T H E R S

MOST EFFICIENT METHOD OF MATERIALS HANDLING BY TRUCK EVER DEVISED

If you collect and move bulky, light or heavy materials in your plant operation . . . be they solid, liquid, dust, rubbish or waste, the Dempster-Dumpster System merits your careful consideration and investigation. This revolutionary method of bulk materials handling by truck can save you thousands of dollars annually!

The fundamental reason why the Dempster-Dumpster System is the most efficient method of materials handling by truck is because, in this system, one truck serves scores of detachable containers. In other words, a truck-mounted Dempster-Dumpster . . . with only one man, the driver . . . picks up, hauls, dumps or sets down intact . . . one after another . . . any required number of big Dempster-Dumpster Containers.

The hydraulically operated Dempster-Dumpster is mounted on any make truck chassis of suitable size.

The steel containers are available in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish. They range in size up to more than three times the capacity of the average dump truck body. The containers are spotted inside and outside your plant at convenient materials accumulation points. A few of the dozens of detachable containers are shown here so that you may see the flexibility of this system in handling all types of materials in your plant with one truck. It may be that none of these containers will fit your own particular need. But remember there are Dempster-Dumpster Containers that will, either standard or special design.

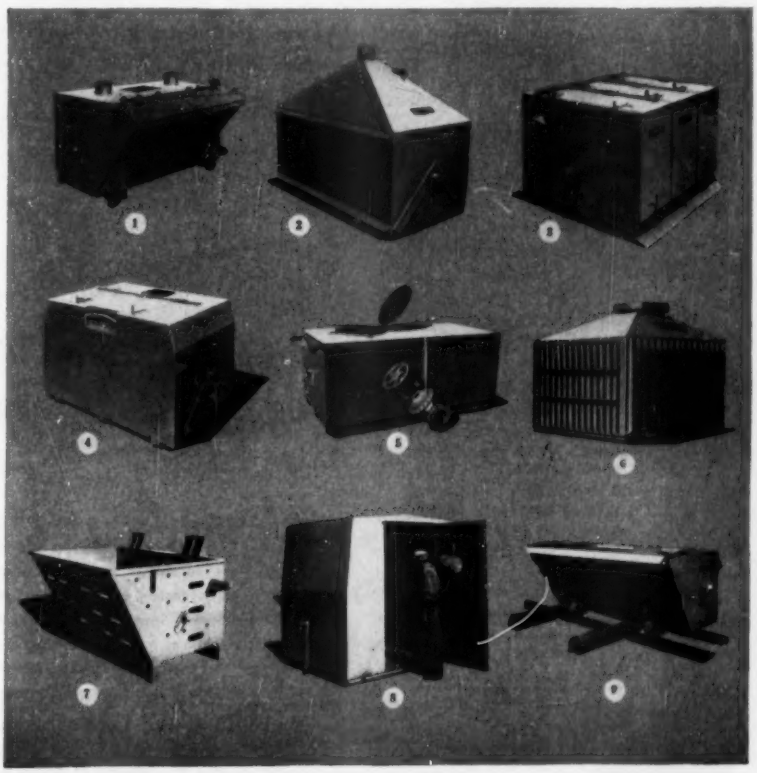
More efficient and lower cost materials handling in your plant may be simply a matter of getting the probing minds of your engineers and ours together. Our files contain hundreds of inquiring letters that ultimately resulted in savings of thousands of dollars annually in every conceivable type of manufacturing plant. A discussion with our engineers might develop the same results for you. If advisable, they will be glad to make, without obligation on your part, a proper survey to determine just what equipment you may need. The Dempster-Dumpster System is manufactured exclusively by Dempster Brothers, Inc.

2—Eliminates Standing Idle Time— One man, the truck driver, replaces truck loading crew. Detachable containers are pre-loaded through normal accumulation. Truck-mounted Dempster-Dumpster and driver never stand idle because there is always a pre-loaded detachable container to be serviced.

4—Increases Efficiency, Sanitation and Good "Housekeeping"— The Demp-Dumpster System is a complete, unified plan for area-wide materials handling. Materials to be disposed of or transferred are placed in a nearby container as they accumulate. Containers used for trash and rubbish are fire-proof, rat-proof and fly-proof. No other method of materials handling by truck can match the Dempster-Dumpster System in efficiency and low operating cost!

• • •

At right are a few containers built for special requirements— 1—Five cu. yd. container with swivel casters for handling waste blast sand. 2—Three cu. yd. Dust Collector Type equipped with gaskets. 3—Multi-Karry Container equipped with three 2 cu. yd. steel boxes with casters and lids. 4—Six cu. yd. drop bottom container with two spring-hinged lids and special loading opening in top. 5—Rectangular Tank Type Container with gate valve and gasketed Lid. 6—Chlorinator Ash Container designed for handling hot residue approximately 1500° F. 7—Tilt Type Container built for cast linings for handling hot materials. 8—One of several special "Tool and Equipment" Type Containers. 9—One of several types of special built containers equipped with ball bearing trucks.



113 Shea Bldg., Knoxville 17, Tenn.

For more facts circle 509 on Reply Card

For an Important INCREASE IN PROCESSING LINE PERFORMANCE

The "1000" Valve, upon installation, goes to work smoothly and effectively without that frequent attention ordinarily experienced.

You don't get those valve "kick-ups" that cause production delays and figure mighty costly over a given period.

"Straight line flow" which is incorporated in the "1000" valve design is the reason you avoid valve troubles.

To find out how this "STREAMLINED" design works to your advantage in elimination of failures, speedier production, no spoilage, and in lower costs, send for Bulletin 962.

There are no complicated inside works in the "1000" valve. As a matter of fact, there is only the one vital moving part — the seat piston. There are no restricted passages—no small ports — no aggregation of close fits.

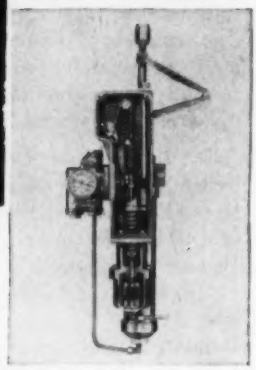
CASH STANDARD Streamlined PRESSURE REDUCING VALVE TYPE 1000

Maximum Capacity When Needed Most • Accurate Pressure Control Under Toughest Working Conditions Trouble-Free Service • Smooth Operation • Tight Closure • Accurate Regulation • Speedier Production Results • Elimination of Failures • Constant Delivery Pressure • Cost Saving Operation • No Spoilage • Practically Zero in Maintenance Costs

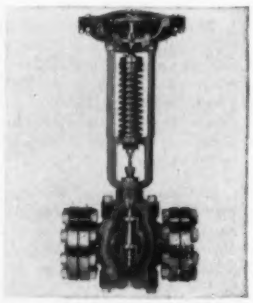
CASH STANDARD CONTROLS.. VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES
Send for them



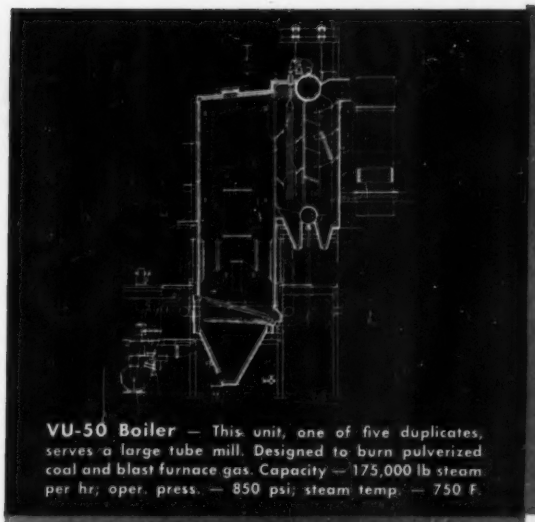
Bulletin 963 features the CASH STANDARD Type 100 Series of Super-Sensitive Controllers — various types for automatically operating valves, dampers, rheostats, stokers, pulverizers, fans, and other apparatus. 16 pages filled with descriptions and applications.



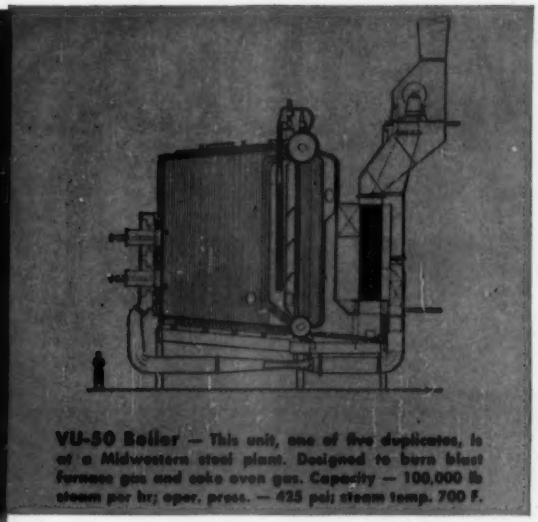
Bulletin 968 features the CASH STANDARD Type 34 Pressure Reducing Valve — direct operated — direct acting for handling steam, hot water, cold water, air, oil, brine—and most liquids and gases except some injurious chemicals. Illustrates and describes the different styles available and tells about their applications. Three pages of capacity charts.

Bulletin 956 features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.

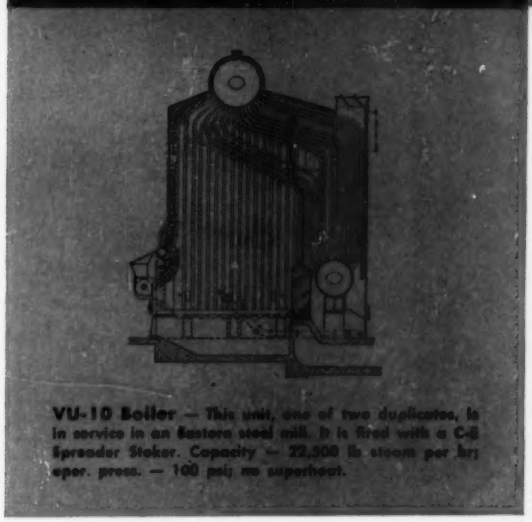
For more facts circle 510 on Reply Card



VU-50 Boiler — This unit, one of five duplicates, serves a large tube mill. Designed to burn pulverized coal and blast furnace gas. Capacity — 175,000 lb steam per hr; oper. press. — 850 psi; steam temp. — 750 F.



VU-50 Boiler — This unit, one of five duplicates, is at a Midwestern steel plant. Designed to burn blast furnace gas and coke oven gas. Capacity — 100,000 lb steam per hr; oper. press. — 425 psi; steam temp. 700 F.



VU-10 Boiler — This unit, one of two duplicates, is in service in an Eastern steel mill. It is fired with a C-E Spreader Stoker. Capacity — 22,500 lb steam per hr; oper. press. — 100 psi; no superheat.

Leading Metal Producers using VU units in one or more plants

Aluminum Company of Canada, Ltd.
Anaconda Wire & Cable Co.
Bethlehem Steel Co.
Bridgeport Brass Co.
Chase Brass & Copper Co., Inc.
Cia. Siderurgica Nacional
Great Lakes Steel Corp.
Jones & Laughlin Steel Corp.
National Tube Co.
Phelps Dodge Corp.
Pittsburgh Steel Co.
Republic Steel Corp.
Revere Copper and Brass Inc.
Sloss-Sheffield Steel & Iron Co.

Industry Leaders select VU

One significant fact about the C-E Vertical-Unit Boiler is its wide acceptance by leading companies in practically every industry. This is so important to *all* companies because buying decisions of the larger manufacturers are often a practical guide for everyone right down the line.

Primary metal producers are an outstanding example. The reliability of their steam generating equipment is of utmost importance, since steam failure may cause extensive damage to costly equipment. It is especially significant then that many of the world's largest metal producers, each guided by its own investigations and conclusions, reached a common decision as to the merits of Vertical-Unit Boilers.

These companies have *proved* their satisfaction with VU Units by buying them again and again. One company purchased three in 1940 . . . three more in 1946 . . . five in 1949 . . . and two in 1951 — *thirteen units in eleven years.* In fact, the fourteen companies listed here have bought a total of 69 Vertical-Unit Boilers.

You can profit from the example of the primary metal industry — or from any industry where steam is exceptionally important. You will find — as so many others have found — that the C-E Vertical-Unit Boiler means lower steam costs through advanced design . . . sound construction . . . proved reliability. If you need steam — from 10,000 to 350,000 pounds per hour — take a tip from the leaders — investigate VU.

COMBUSTION ENGINEERING—SUPERHEATER, INC.

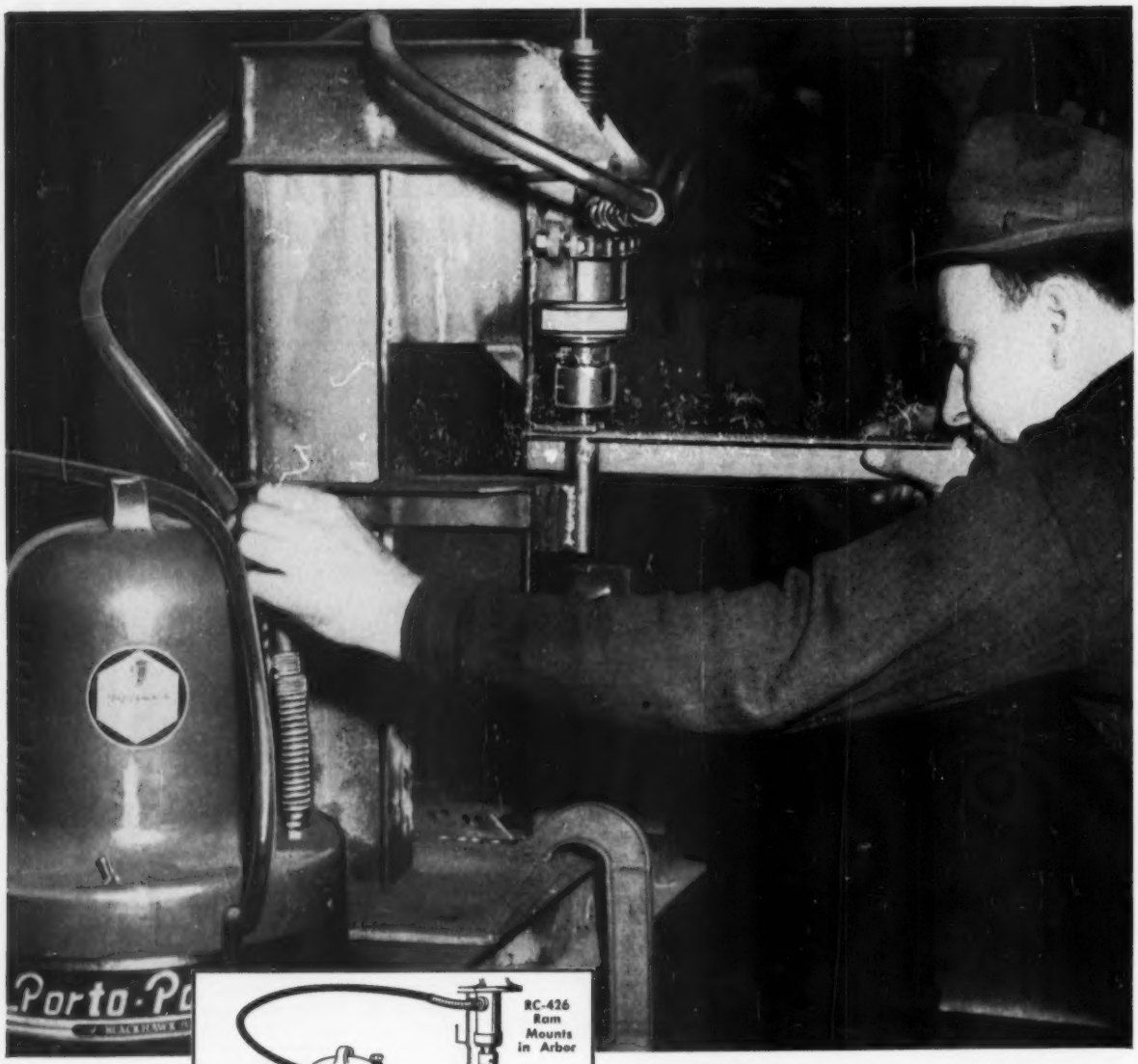
Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

B-625A

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

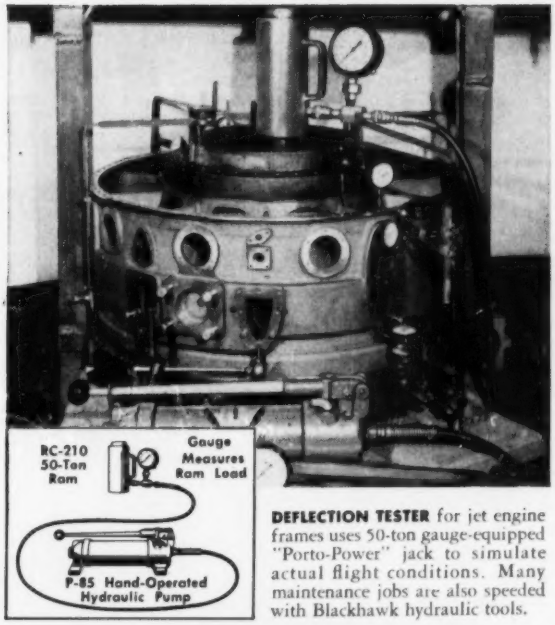
For more facts circle 511 on Reply Card

With IDEAS like these and hand tools



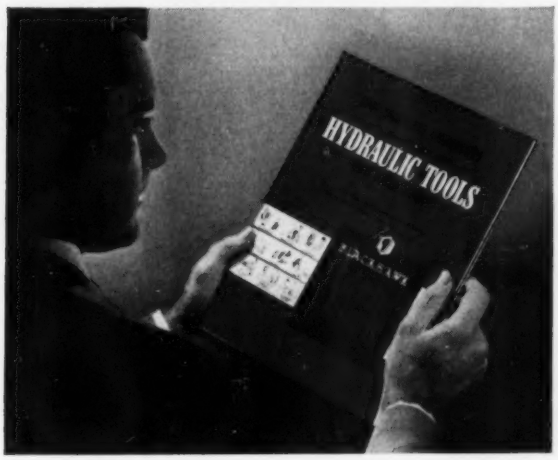
THIS SHOP-BUILT PUNCH PRESS was made with inexpensive, standard "Porto-Power" hydraulic components to meet a special production problem. The 10-ton hollow push-pull ram, with its power-driven pump, pierces 12 holes per minute in ½ in. angle iron.

.... hydraulic tools multiply manpower!



DEFLECTION TESTER for jet engine frames uses 50-ton gauge-equipped "Porto-Power" jack to simulate actual flight conditions. Many maintenance jobs are also speeded with Blackhawk hydraulic tools.

UNIFORM STUD TIGHTENING is assured with "Tork-flash" tension wrench. No guesswork on this assembly line! Other hand tools in broadened Blackhawk line offer similar gains in time, accuracy.



And IDEA BOOK shows you 1001 short-cuts that save time, money, materials

Yes, many industrial and construction methods today are being revolutionized by Blackhawk Hydraulic Tools and Hand Tools. Throughout maintenance and production — on such varied jobs as testing and field service . . . welding and inspection — savings in time, money and materials are often spectacular.

Safety and ease are introduced to many tasks formerly downright dangerous and back-breaking. You'll find 64 pages of these valuable ideas in the great Blackhawk IDEA BOOK. So — get your free copy from "The Man Who Knows," your industrial supply salesman. If your distributor cannot supply you with an IDEA BOOK, write on your company letterhead to Blackhawk Mfg. Co., Dept. M-4913, Milwaukee 1, Wisconsin.

HEADQUARTERS FOR THE WORLD'S MOST COMPLETE LINE OF HYDRAULIC TOOLS . . . plus INDUSTRIAL HAND TOOLS

BLACKHAWK®

Visit our Booths 426-428-430 at the PLANT MAINTENANCE SHOW, Cleveland, Jan. 19-22

For more facts circle 512 on Reply Card

you DETERMINE THE COST OF cold

WHEN cooling water is manually controlled, the operator usually plays safe by running with everything wide open. Result—*overcooling*.

WHEN YOU OVERCOOL IN	YOU PAY MORE
1. Internal Combustion Engines and Compressors	by lower efficiency by impaired lubrication
2. Process work	by wasting 50% or more of cooling water used by increasing rejects
3. Refrigeration	for compressor power. For example, it costs 15% more to cool milk to 37°F than to 40°F.

Sarco dependable, self-operated cooling controls prevent overheating and overcooling and assure maximum efficiency at minimum cost.

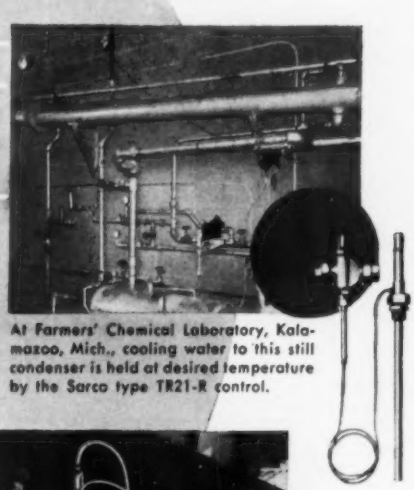
Four typical examples are shown in our illustrations. Hundreds more are in our files.

Ask for Catalog 700-13. Sarco Company, Inc., Empire State Bldg., New York 1, N. Y. Represented in principal cities. Sarco Canada Ltd., Toronto 8, Ontario.

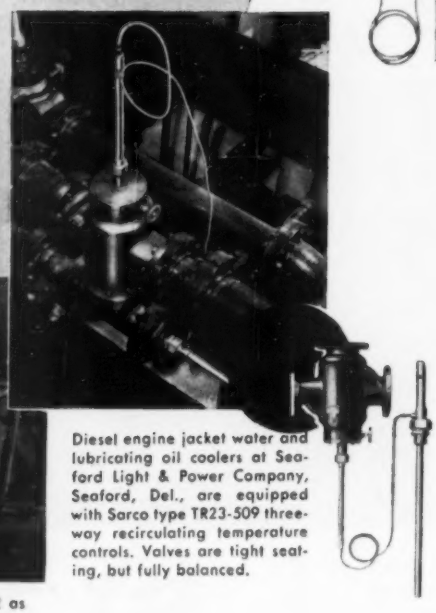
SARCO saves steam

a sarco regulator for every job

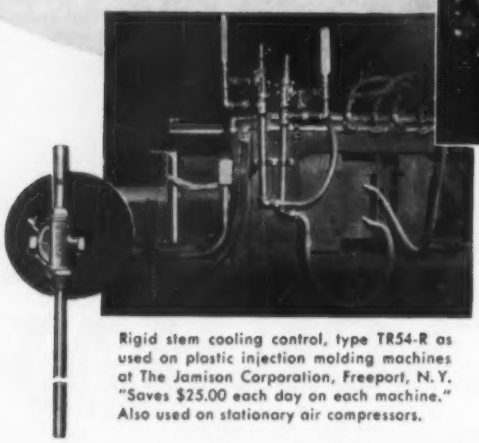
Schramm water-cooled stationary air compressors use Sarco rigid stem cooling controls, type TR44-R as a standard accessory. These Sarco Regulators protect the compressor, assure efficient operation and save water besides.



At Farmers' Chemical Laboratory, Kalamazoo, Mich., cooling water to this still condenser is held at desired temperature by the Sarco type TR21-R control.



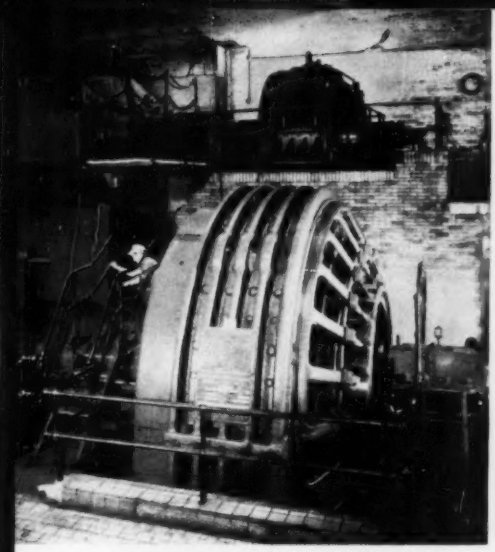
Diesel engine jacket water and lubricating oil coolers at Seaford Light & Power Company, Seaford, Del., are equipped with Sarco type TR23-509 three-way recirculating temperature controls. Valves are tight seating, but fully balanced.



Rigid stem cooling control, type TR54-R as used on plastic injection molding machines at The Jamison Corporation, Freeport, N. Y. "Saves $25.00 each day on each machine." Also used on stationary air compressors.

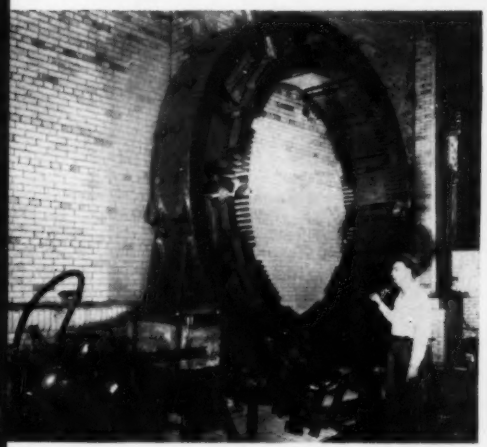
430

For more facts circle 513 on Reply Card



Complete spares are kept for these key motors—a 7000-hp reversing-mill drive motor and the slabbing mill's 1650-hp d-c screwdown motor.

Wheeling Steel's equipment reconditioning program at Steubenville was planned by its superintendent in charge of operation and maintenance of electric equipment, James Farrington (right). Helping him are (right to left) George Merrick and Henry Ford, assistant superintendents, and (standing) Karl J. Doll, manager of the G-E Apparatus Service Shop in Pittsburgh.



Ready to replace any of 3 generators in the plant's main motor-generator set (already reconditioned) is this spare 2400-kw generator frame.

Motor pool comprises smaller spare motors, all reconditioned. Full information on each motor and its location is maintained in an equipment record system.

Standby renewal parts for electric equipment are kept in this storage room, one of several at Wheeling.

***Productive* Maintenance** "kit" contains helpful maintenance literature, plus "tools" that help sell management on need for full maintenance program.

Management is "Maintenance-minded" at Wheeling Steel Corporation

Here's how to develop management support for <u>your</u> maintenance program

Wheeling Steel Corp., of Wheeling, W. Va., shows what maintenance men can really do with full management support. "Our successful maintenance program," says J. H. McElhinney, operating vice president, "was devised and supervised by our maintenance department" and plays a major part in keeping output high.

To help *you* present your maintenance story to the top men in your plant, General Electric offers a new *Productive* Maintenance program. Its spearhead is a kit of maintenance information that helps you *prove* how Productive Maintenance can raise *your* plant's output. For your kit, contact your nearest G-E Apparatus Service Shop or write to General Electric Co., Section 801-8, Schenectady 5, N. Y.

GENERAL ELECTRIC

FAIRMOUNT
NEW
SOCKET
WRENCHES

MAKE
QUICK WORK
OUT OF
HARD WORK

A new line, a complete line, of ultra modern design. Developed and engineered by professional users.

Behind the manufacture of Fairmount Socket Wrenches are many years of precision craftsmanship. Every piece of steel accepted must pass rigid chemical and magnetic tests for surface and subsurface defects. Advanced metallurgical knowledge and heat treating methods give the ultimate in strength—maximum power combined with compactness.

A wide range of sizes and attachments in four drives — Heavy Duty, Standard, Light and Midget — to fill the most rugged assignments or with strong, thin walls for closest of quarters. All processed by modern polishing methods and triple chrome plated.

Ask your mill supply or hardware distributor for Fairmount Socket Wrenches or write us for catalog and further information.

FAIRMOUNT
TOOL & FORGING, INC.
10611 Quincy Ave., Cleveland 6, Ohio

For more facts circle 516 on Reply Card

BACKTALK
ABOUT PAST ISSUES

Way-Back-When Request

PLANT ENGINEERING:

"In the interest of furthering the private industrial plant protection program in the Third Naval District (New York, New Jersey and Connecticut), I would appreciate a copy of the Plant Protection Guide mentioned in the article 'Plant Protection Is Your Problem in Civil Defense,' appearing in the December, 1950 issue." *Henry J. Schafer, Lt. Comdr., U. S. Navy.*

For Posters?

PLANT ENGINEERING:

"We are wondering if it would be possible to obtain 12 photographs approximately 24 in. by 24 in. of the picture shown in the November issue, on the bottom of page 106, which shows the portable display of fire extinguishers." *Charles A. Plumley, Chief Engineer, Patch-Wegner Co., Inc.*

Inquiries to Be Handled Promptly

PLANT ENGINEERING:

"We are very appreciative of the effort the magazine makes in seeing that inquiries are handled promptly. I am referring to the number of letters we have received with regard to the Fiberfrax story. These inquiries follow the excellent editorial job reporting on the development.

"This is just a note to say we will see that these letters are handled promptly." *John Sasso, Director of Publicity, G. M. Basford Co.*

Parking Lot Article Helpful

PLANT ENGINEERING:

"In the July, 1951 issue you published an article entitled 'Parking Lot Layout Is Planned to Handle Large Volume of Cars,' by V. McCabe. This article has proved very valuable to us in laying out our parking lots, and we have loaned it to many people for similar use.

"We are now unable to locate this issue and would like very much to have a reprint copy if it is possible." *John Goldsworth, Supt. of Construction, Western Michigan College of Education, Kalamazoo, Michigan.*

PLANT ENGINEERING:

"We read with interest an article which appeared in the November, 1952 issue, on page 92, written by M. R. Blish, Plant Engineer of the Dictaphone Corp., regarding the solving of their parking lot problems.

"In his article, Mr. Blish refers to one written by V. McCabe, Plant Engineer, in the July, 1951 issue headed 'Parking Lot Layout Is Planned to Handle Large Volume of Cars.' As we have a similar parking lot problem the writer would appreciate receiving, if still available, a copy of the article written by Mr. McCabe." *E. C. Brocke, Plant Superintendent, Elizabeth Iron Works, Inc.*

Acid-Handling Article

PLANT ENGINEERING:

"Please send us 6 tear sheets of the article 'Acid-Handling System Is Designed for Maximum Safety' by John Snedden, Chief Plant Engineer, Norris Thermador Corp. that appeared in the September, 1952 issue of PLANT ENGINEERING." *H. B. Ahlberg, Plant Manager, Commercial Filters Corp.*

Other Uses for Liquid Neoprene

PLANT ENGINEERING:

"On page 92 of the October, 1952 issue there is a description by R. C. Gerow of Gates Engineering Co. of a process using liquid neoprene to prevent corrosion of steel tanks.

"I would appreciate very much your sending me information as to where to obtain both the primer and the liquid neoprene. We wish to use it on the outside of our anodizing tanks where we have a 10 per cent solution of sulfuric acid. We might also try it on the inside of our rinse tanks." *John Thompson, Maintenance Foreman, Pittsburgh Plate Glass Co.*

Right to the Source

PLANT ENGINEERING:

"As a result of a listing in your publication, we have received numerous returns which are forwarded to us from your office.

"The envelope in which these are mailed to us uses the words 'Plant Engineering' and as a result of this the mail is sent to our Plant Engineering office.

"In the future could you please address the inquiries to Stanley Tools, 111 Elm St., New Britain, Conn., and then add, attention, Advertising Department. This will mean that they will reach us directly and the Plant Engineering office will not be bothered." *D. E. Buckwell, Asst. Advertising Manager, Stanley Tools.*

Lost, Strayed or Stolen?

PLANT ENGINEERING:

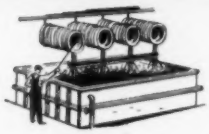
"In reviewing the May, 1952 issue we found an article (Part I) titled 'Oil Reclaim Systems' written by William J. O'Connell, Process Engineer. This article was most informative and pertinent to a study being made by the writer.

"However, Part II of the article, covering 'Selection procedure and how one plant went about the job of systematically finding out the type of reclaiming

For PROTECTION that fits the Job!

Specify PITT CHEM TAR BASE COATINGS

PITT CHEM 101



A heavy-film coating for protection of metal, masonry, stone and brick against very corrosive vapors, acid and alkali spillage and extreme moisture conditions.

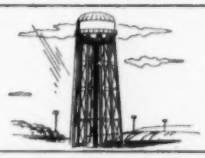
PITT CHEM 102

A thin, high gloss maintenance coating to protect metal and concrete surfaces against normal atmospheric corrosion, mildly corrosive vapors and moisture.

PITT CHEM 103

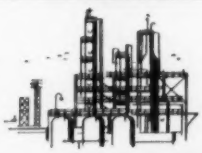
A heavy duty general maintenance coating for moderately severe corrosive conditions like dilute mineral acids, alkalies, sewage, moisture and corrosive vapors.

PITT CHEM 104



Specifically formulated to protect potable water tanks and water transmission equipment. Dries very quickly and imparts no taste or odor to potable water.

PITT CHEM 105



An irreversible, fast drying coal tar emulsion which provides excellent corrosion resistance on metal, concrete, brick and stone.

W&D 4430

Write For FREE Corrosion Control Booklet

Tells where tar base coatings can save you money in your plant ... what grades to use ... how to apply them.

PROTECTIVE COATINGS DIVISION

P C&C G

PITTSBURGH COKE & CHEMICAL CO.

Grant Building - Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

For more facts circle 517 on Reply Card

New Floodlamps Solve Tough Problems Indoors and Outdoors

NICKEL PLATED BASE
WEATHERPROOF HARD GLASS
SILVER REFLECTOR INSIDE STAYS BRIGHT ALWAYS
MAXIMUM LIGHT OUTPUT • WIDE BEAM

200 to 1000 Watts
St'd. or High Voltage

For High or Low Bays

High light output maintained throughout lamp life. Only simple socket required. No reflectors to clean.

For Wet or Dusty Locations

Hard glass withstands moisture and sudden temperature changes. Inside silver reflector not affected by dirt and corrosive fumes.

For Outdoor Lighting

Permits use of low-cost weatherproof housing, reducing cost, size, and weight of installation. Easy to maintain.

Send for Technical Bulletin 80

RADIANT HI-FLOOD *Reflector Weatherproof* FLOODLAMPS

RADIANT LAMP CORPORATION
300 Jelliff Avenue Newark 8, N. J.

Manufacturers of Lamps for
PROJECTION • FLOODLIGHT • SPOTLIGHT • MOTION PICTURE PRODUCTION
AERONAUTICAL • SPORTS LIGHTING AND GENERAL SERVICE • RECTIFIER BULBS
For more facts circle 518 on Reply Card

system to use' was to be printed in a later issue—possibly the June or July, 1952 issues which have completely vanished from our office.

"We would certainly appreciate receiving either a copy of the article or a copy of the issue in which it appears." *A. G. Bally, Plant Engineering Department, International Business Machines Corp.*

Editor's Note: The second part of this article "Case Study on How to Choose the Right Type for Your Plant" appeared in the June, 1952 issue. A copy of this issue is being sent to you.

Two Minds With But a Single Thought

PLANT ENGINEERING:

"Explain cartoon (see cut) on page 196 of the November issue." *R. W. Spradling, Operating Engineer, U. S. Rubber Co.*

PLANT ENGINEERING:

"Will you please explain the cartoon that appears on page 196?" *A. B. Millett, Secretary, Saginaw Lumber Co.*

Editor's Note: The artist sketched this cartoon to fit in with the old saying "That's a horse of a different color." Apparently, the horse has just heard of the old saying and wants to be one.

Inquiry on Beta-Ray Gage

PLANT ENGINEERING:

"We have noted an article on page 88 of the January, 1952 issue describing certain applications of the beta-ray thickness gage. Please advise us where we can obtain more information concerning this device." *I. S. Bull, Engineer, J. P. Stevens & Co., Inc.*

More Information on Flame Plating Desired

PLANT ENGINEERING:

"We are interested in the article 'Flame Plating,' which appeared in the October, 1952 issue. We have several applications where abrasion has been a problem to the life of tools. Attached to this letter is a print of a special valve that is used with a sand based material, and the life of the valve has been as low as 4 hours.

BACK TALK

"Additional information on the flame plating process, estimate of cost and delivery on this valve would be appreciated." *L. J. Moriarity, Fisher Body Div., Process Development Plant, General Motors Corp.*

PLANT ENGINEERING:

"Please furnish this laboratory with all available information on the flame plating process. The article in the October, 1952 issue looks very promising for our line of operations." *William Dey, Jr., Procurement and Supply Officer, National Advisory Committee for Aeronautics, Lewis Flight Propulsion Laboratory.*

Further Info on Dust Article

PLANT ENGINEERING:

"In the November, 1952 issue there is an article titled, 'Dust-Proof Production Line Builds Accuracy Into the Product.' We are in the watch, clock and aircraft instrument manufacturing business and have been smothered with dust and lint.

"I would like to get further detailed information concerning Northrop's installation. Such questions as to what type dust counter is used, who engineered the over-all project, etc." *S. A. Ali, Industrial Engineer, The United States Time Corp.*

Request for Beaver Plant Article

PLANT ENGINEERING:

"I am interested in the article 'Plant Engineering Department at Westinghouse Beaver Plant Improves Quality, Production,' published in the September, 1952 issue.

"Please send me two copies of the reprint of this article, if available, or two copies of the September issue." *G. Donta, U.S. Representative, Ercole Marelli & Co., Milano, Italy.*

Questions on Fiberfrax

PLANT ENGINEERING:

"In the September, 1952 issue, there is an article regarding Fiberfrax, the versatile new fiber. We are very much interested in this product and would appreciate your answering the following questions:

"1. Can it practically be used in place of fire brick in furnaces that melt scrap aluminums and brasses back into ingots for foundry use?

"2. How does it compare with the life of refractory brick?

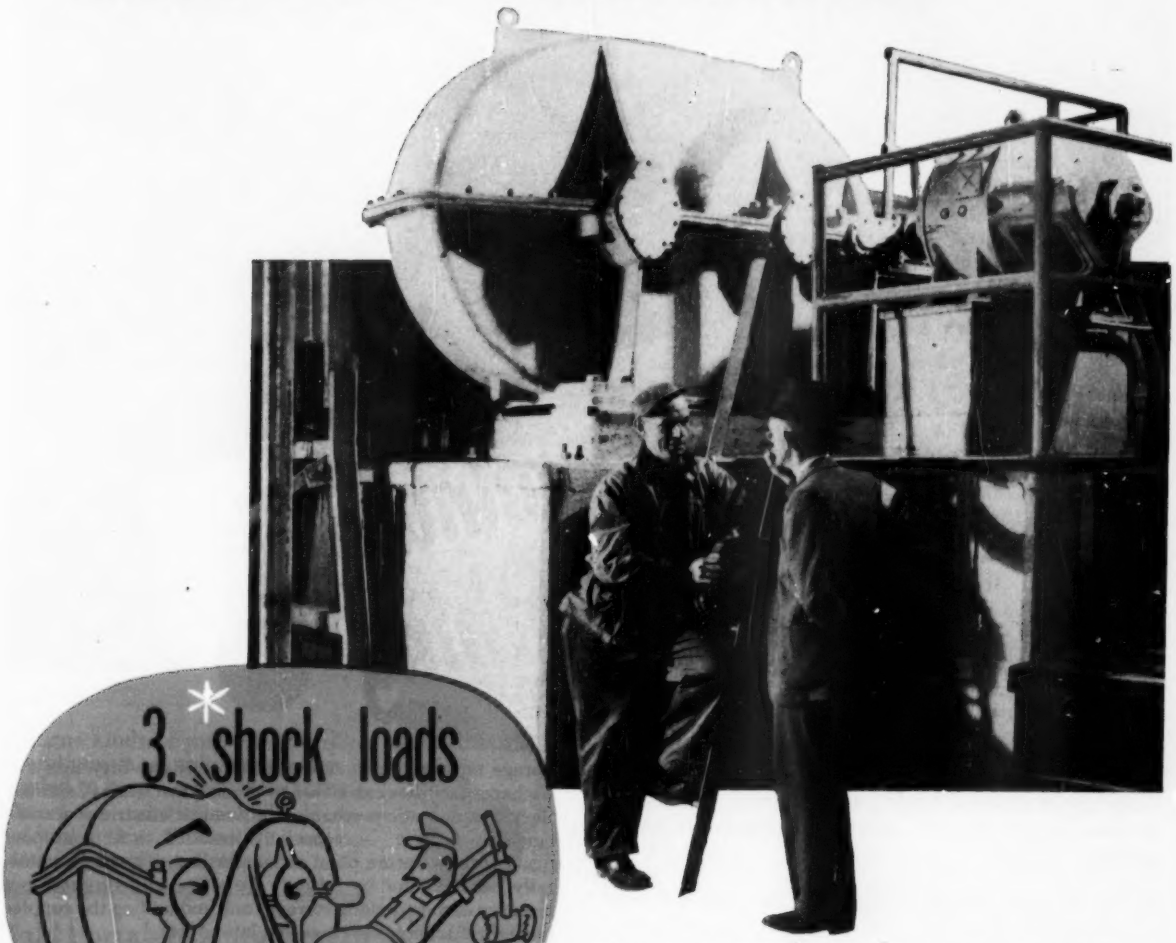
"3. How would the price compare in lining furnaces with this material instead of brick? Brick has been the standby on furnace linings in the past, but in our industry, with the heats needed for remelting, we are compelled too often to reline our furnaces.

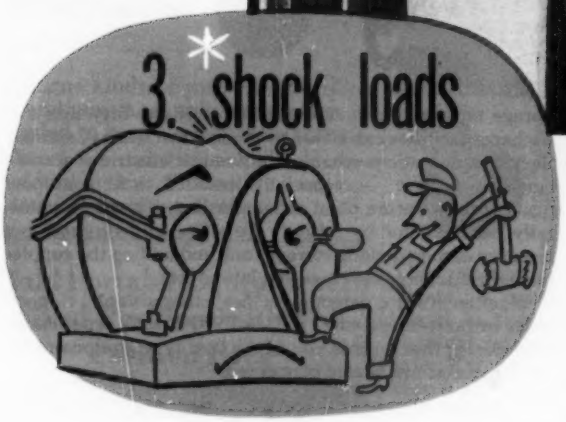
"If this fiber is practical for this purpose, we are very much interested in using it as a liner, based on the three questions above." *Samuel J. Teller, Auditor, Berg Metals Corp.*

Editor's Note: Your questions have been forwarded to The Carborundum Co., manufacturers of the product.

Better gear protection
*when you need it!**

—GULF E. P. LUBRICANTS





With Gulf E.P. Lubricants you get extra protection against gear troubles when production demands put shock loads on equipment. They are specially compounded to prevent metal-to-metal contact and help protect against pitting, spalling, and excessive wear.

For specific recommendations for your equipment, call in a Gulf Sales Engineer today. Write, wire, or phone your nearest Gulf office.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company
Pittsburgh 30, Pa.

For more facts circle 519 on Reply Card

You could know the plant... 20 years of steady growth ...20 years of work, brains and money...then in 20 minutes a little fire got away and reduced it all to nothing.

But, your larger size fire hazards can be protected very efficiently at a reasonable cost, thanks to C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems. Simple piping, running from one centrally located storage tank, instantly transports clean, non-damaging, non-conducting carbon dioxide anywhere in the plant area...to flammable liquids, electrical equipment, storage spaces, manufacturing processes and record vaults. Fire at any protected location is extinguished in seconds with an absolute minimum of expense and interruption.

Flexibility is the keynote with these C-O-TWO Fire Extinguishing Systems . . . the low pressure carbon dioxide storage tanks range in capacities from one to fifty tons . . . discharge facilities can either be manual mechanical, manual electric, automatic mechanical, automatic electric or a combination of these . . . especially installed to fit your particular needs. Future plant expansion is easily and economically provided for by initially installing an oversized low pressure carbon dioxide storage tank and adding the supplementary discharge facilities at a later date.

Whether it's fire detecting or fire extinguishing . . . portables or built-in systems . . . C-O-TWO means experienced engineering that assures you of the best type equipment for the particular fire hazard concerned.

WHEN BUSINESS STOPS . . . INCOME STOPS!
Don't take chances with your investment. Secure the benefits of highly efficient fire protection engineering today . . . our extensive experience over the years is at your disposal without obligation. Get the facts now!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

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For more facts circle 520 on Reply Card

MATERIALS-HANDLING NEWS

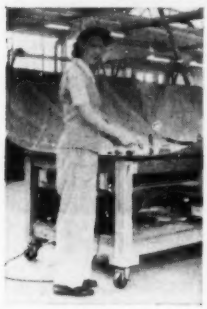
★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

Casters Equipped With These Conveniences Make Materials-Handling Easier, More Economical

Plunger-type Lock Prevents Swivel From Operating

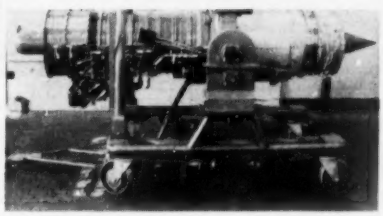
Sometimes it's desirable to keep a caster from swiveling. For such applications, there are many standard Bassick Casters which can be supplied with the easily operated plunger-type Swivel Lock. Complete flexibility in handling operations, for close quarters or long hauls.

Locking Is Sure With This Wheel Brake



In some kinds of materials-handling operations, a simple mechanism is needed to keep a wheel from turning. There's no substitute for the sure-holding action of Bassick's hand-operated Side Wing Brake.

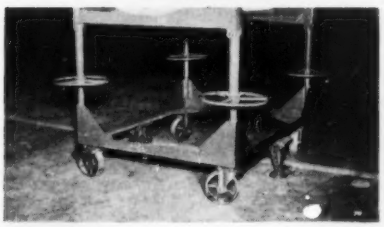
Exclusive Sprung-Wheel "Floating-Hub" Absorbs Materials-Handling Shocks



Loads are more safely and easily moved over rough surfaces when carried in equipment rolling on Bassick "Floating-Hub" Casters.

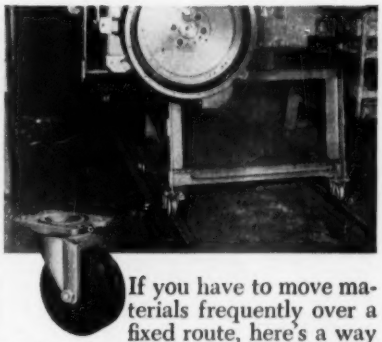
This patented construction actually "floats" a spring-controlled caster wheel in the frame, providing mechanical resiliency between rim and axle. Even over bumps, all wheels keep in contact with the floor. Hence, load distribution is always even. That's why Bassick's "Floating-Hub" means sure protection for highly-finished auto bumpers, ceramic products, glass and china ware, loose loads of small precision parts and innumerable fragile loads.

Hold Portable Equipment In Fixed Position With This Position Lock



Install Bassick Position Locks on portable equipment, and you can hold it in position with an easy, downward press of the lock's foot lever. This action places almost 12 sq. in. of friction locking surface in contact with the floor. A slight upward pressure under the lock's lever releases it.

Boost Materials-Handling Efficiency With Grooved Wheels on Angle Track



If you have to move materials frequently over a fixed route, here's a way to do it faster and more economically.

Equip trucks and dollies with Bassick Grooved-Wheel Casters and move them on inverted angle iron track. By doing so, you control movement along the route with production-line efficiency, and also make movement three times easier than flat wheels in direct contact with the floor.

Angle iron track is easily installed, inexpensive, self-cleaning. Bassick Grooved-Wheel Casters operate on the track or in direct contact with the floor.

They come in 4, 6, 8, 10 in. sizes, swivel or rigid.

Write for full details — no obligation

Write us for full data on any of the products discussed here, or information on any Bassick Caster. Bassick makes the world's largest line with the sizes and types for everything you wish to move easily, quietly, efficiently. Consult your local Bassick industrial distributor for expert advice, backed by our factory engineering assistance when needed.

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
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Bassick
A DIVISION OF STEWART SW WARNER
MAKING MORE KINDS OF CASTERS... MAKING CASTERS DO MORE

For more facts circle 521 on Reply Card

ARE CLOGGED LINES LIKE THESE CUTTING YOUR WATER SUPPLY?

Over 1½ Miles of Buried Water Line Chemically Cleaned IN PLACE by Dowell Service

You don't have to dig up water lines in order to clean them! Take the case of a major railroad that had over 8600 feet of *buried* water lines, ranging from 2 to 12 inches in diameter. The capacity of these lines had been greatly reduced by scale deposits. Dowell Service used liquid solvents to clean all the lines, *in place*, during a period of only six days with a minimum interruption in service.

Dowell Service offers *fast*, effective chemical cleaning of pipelines of all kinds—water lines, disposal lines and product lines. And, whether these lines are underground or above, indoors or out, no digging or dismantling is necessary. Dowell solvents are designed to dissolve the accumulated deposits, and are introduced through regular connections. Because they are liquid, Dowell solvents reach wherever steam or water can flow, cleaning places inaccessible by other methods—angles, curves, valves, complicated surfaces and hook-ups. *Experienced* Dowell engineers do the job using Dowell-designed truck-mounted pumps, mixers and control equipment.

Many other types of equipment can also be cleaned chemically by Dowell. If you have boilers, condensers, evaporators, bubble towers, water wells or other operating equipment where deposits are reducing capacity, let Dowell Service *save you time and money in maintenance cleaning!*

FIND OUT ABOUT CHEMICAL CLEANING! There are many places in your plant where Dowell Service can clean equipment faster and better than out-dated mechanical methods. Call your nearest Dowell office for a fact-filled book. Or write direct to Tulsa, Dept. A24.

DOWELL SERVICE

Over 100 Offices to Serve You with Chemical Cleaning for:

Boilers • Condensers • Heat Exchangers • Cooling Systems
Pipe Lines • Piping Systems • Gas Washers • Process Towers
Process Equipment • Evaporators • Filter Beds • Tanks

Chemical Services for Oil, Gas and Water Wells

DOWELL INCORPORATED
Tulsa 1, Oklahoma

Look to DOWELL
FOR OIL INDUSTRY CHEMICAL SERVICE

For more facts circle 522 on Reply Card

FOR CLASSY SHOPS

. . . OR BUSY PLANTS

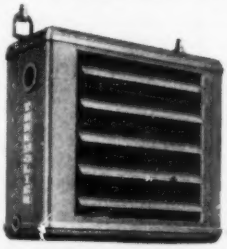
THERMOLIER UNIT HEATERS

The condensed table below is a quick guide to the selection of the correct Thermolier for specific conditions. The capacities, when motors are operating at normal speeds, are based on Standard Basis of Rating: 2 lb. steam pressure and 60° F entering air temperature.

Grinnell Thermoliers are tested and they are rated in strict accordance with rules of the Industrial Unit Heaters Association.

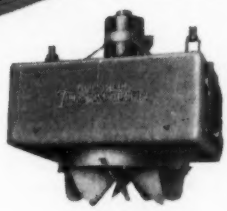
All Thermoliers can be operated at working steam pressures up to 125 psi and steam temp. up to 406° F.

A MODEL AND SIZE FOR EVERY PURPOSE

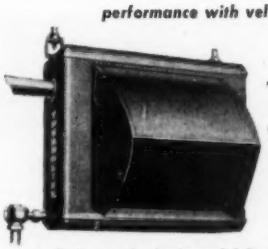


horizontal delivery

textile (horizontal delivery)



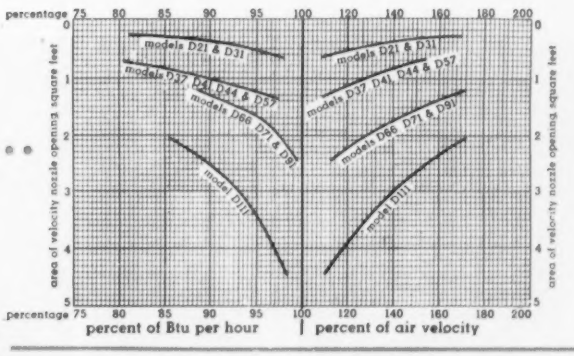
vertical delivery



velocity nozzle (horizontal delivery)

model	total heat delivered, Btu per hr	sq ft edr (nominal)	air velocity at exit, louvers open, lin. ft. per min.
horizontal delivery			
D21	35,600	148	786
D31	48,700	203	851
D37	62,200	259	753
D41	71,000	295	901
D44	84,100	350	887
D57	101,300	422	1016
D66	128,700	536	779
D71	151,700	632	977
D91	196,000	817	985
D111	275,300	1147	1048
Textile			
TX70	69,800	291	826
TX110	113,700	474	877
vertical delivery			
VA1042	50,800	212	1399
VA1045	73,600	307	1287
VA1065	109,400	456	1354
VA1075	145,600	607	1231
VA1101	185,000	770	1495
VA1111	257,000	1071	1631

performance with velocity nozzle ▶


percentage 75 80 85 90 95 100 120 140 160 180 200
area of velocity nozzle opening square feet
0 1 2 3 4 5
models D21 & D31
models D37, D41, D44 & D57
models D66, D71 & D91
model D111
percent of Btu per hour
percent of air velocity

GRINNELL

THERMOLIER UNIT HEATERS

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Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports
Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

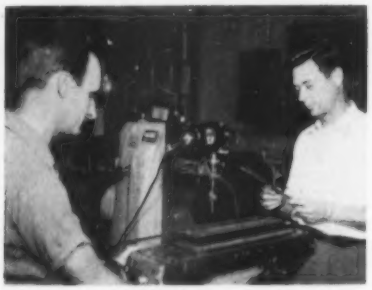
For more facts circle 607 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Condenser Discharge Welding

A NEW CONDENSER discharge technique for spot welding butt joints of very thin stainless steel for use in model making has been developed



Condenser discharge welding equipment is shown mounted on a milling machine. Jig on table holds work in position

by workers at the U.S. Naval Ordnance Lab.

The construction of models required the making of butt welds with stainless steel varying in thickness from 0.005 to 0.025 in. Physicist Marvin S. Weinstein found this could be accomplished if intense heat is applied for a very short time (between 0.001 and 0.010 sec.) and the material to be welded is supported in special jigs.

To produce the neatly and strongly welded T and I beams which were required, several conditions had to be maintained. In the first place, the voltage to which the condenser used in the setup is charged has to be controlled to within 3 per cent to obtain satisfactory welds.

Furthermore, it was found that the pressure applied has to be maintained closely with the weld being initiated shortly before maximum pressure is applied.

The size of the electrode is also a matter calling for close control. If it is too large, no weld results. If it is too small, the concentration of heat is too great and the material burns.

In fact, the burning of the flange material was one of the problems which was a constant headache until an alcohol immersion technique was improvised. Burning was minimized by rapid cooling through evaporation immediately after the weld takes place.

In addition, the coating action of the alcohol reduces oxidation and keeps electrode contamination at a minimum.

The finished products can be made in any desired lengths and under certain conditions can be bent into any desired shape without breaking the weld. *From Report, published by U.S. Naval Ordnance Laboratory, Silver Spring, Maryland.*

Wonder Gas — Helium

DURING WORLD WAR II, helium, which has been used primarily for military purposes since the early twenties, became an important industrial tool.

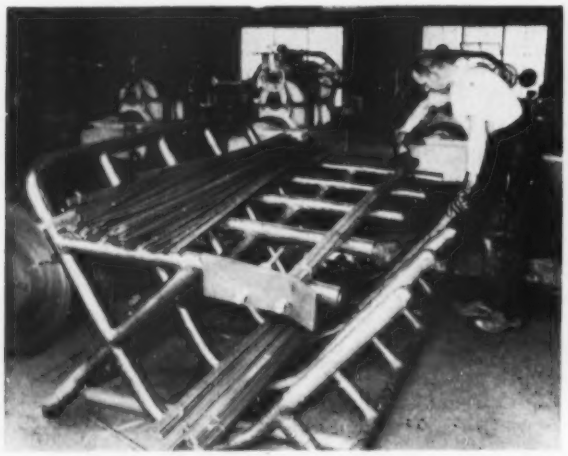
Employed as a shield around a tungsten electrode through simple techniques, helium was effective in the arc welding of magnesium as well as aluminum, copper, stainless steel, titanium and other metals which became of major importance in peacetime production. It was

Bench Made of Welded Tubes Simplifies and Speeds up Bundling and Handling of Steel Strips

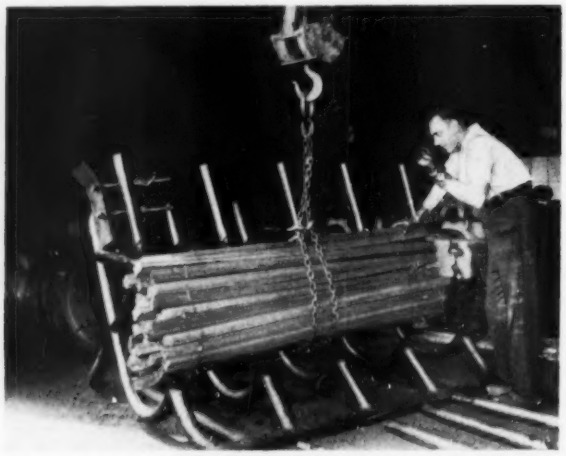
MANY HELPFUL employee suggestions have resulted in improved production and a savings in time and effort at the Steel, Peech and Tozer, Ltd., plant in Sheffield, England.

One typical example of the results of these helpful suggestions can be seen in the specially-designed bench to assist the operator in bundling short lengths of steel strips.

Two or three tons of loose steel strip are delivered by overhead crane and placed on top of the bench. The required number is bundled together with a thin metal band. The operator then pulls the bundle over the end of the bench and it falls into the cradle below. Several bundles are taken away at once. *From Target, published by British Information Services, N. Y.*



Specially-designed bench permits operator to bundle required number of strips, then "chute" bundle to cradle below—where they will later be picked up by overhead crane—rather than the former method of lifting strips from floor



After all the strips have been bundled the crane returns to carry them away. The tubes forming part of the cradle are removed. The other tubes forming part of the bench are lifted clear to permit clearance for removal of bundles

"NICHOLSON TRAPS PROVE THEMSELVES"

..in plant of one of Big 6 chemical firms

The importance of improving heat transfer efficiency in today's great processing plants increases as the proportion of critical applications grows and steam consumption mounts. The letter at the right is from one of the great chemical companies which have adopted Nicholson traps. Another of them recently reported that Nicholson traps were installed at one of their plants as part of a campaign to promote economical steam use. It resulted in a yearly saving of $500,000. See why an increasing number of leading plants are standardizing on Nicholsons.

...CHEMICAL COMPANY

...Main St.
...Texas

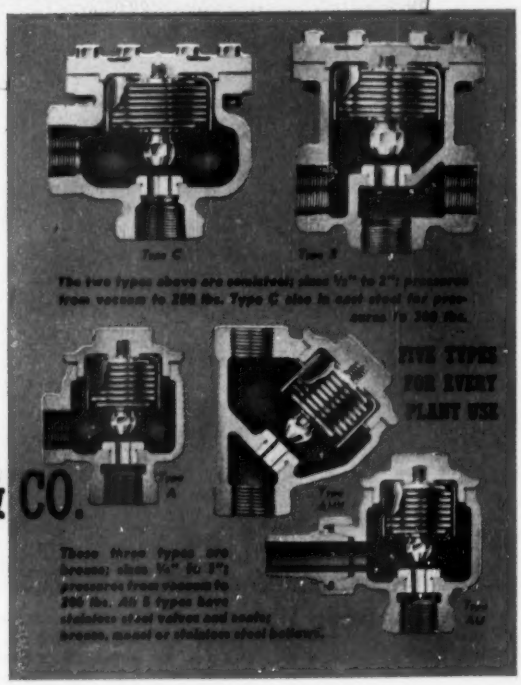
W. H. Nicholson & Co.
Wilkes-Barre, Pa.

Gentlemen:

Your representative, Mr. _____, said he believed you would appreciate it if we would send along to you the following information on Nicholson steam traps used in our plant.

We use above traps for processing and heating. We have previously used____ ____, _____ and _____ traps. Some of these are still in use. However, Nicholson traps have proved themselves in our plant. We do not have a record of our saving in heat-up time and increased production.

Yours very truly,
Signature Deleted



Send for TRAP CATALOG 751

This 32-page standard reference is complete with installation diagrams as well as charts and formulae for determining proper size of trap.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

208 OREGON ST., WILKES-BARRE, PA.

Sales and Engineering Offices in 58 Principal Cities

For more facts circle 524 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

found that helium protected the molten metal from the intrusion of oxygen and impurities in the air which caused inferior welds.

Helium is the second lightest substance known to man. Used as a tracer, it detects leaks in vacuum and pressure vessels. Because its refractive index is very near unity, it is used to fill spaces between lenses in optical instruments. Helium is the second best heat conductor discovered. It will also conduct electricity seven times better than air.

Light waves are distorted less when passing through a helium atmosphere than through any other gas. And helium will escape through an opening that air will not.

Helium is separated from natural gas by a cooling process. As helium does not readily liquefy, the gas is brought to a temperature below the liquefaction point of its ordinary constituents. Then it is cooled in a high-pressure vessel, to about 300 F when it is still gaseous and can be drawn away. The other constituents flow from the bottom as liquid which is vaporized in heat exchangers.

No longer a laboratory curiosity, helium is produced in large quantities at high purity and reasonable cost. The Bureau of Mines believes that its growth as an industrial tool depends largely upon the rate at which knowledge concerning its properties, cost and availability can be disseminated. *From Defense Production Record, published by Government Printing Office, Washington, D.C.*

Missile Cleans Tubes

THE WORKMAN at Newport Electric Corp., in Newport, R. I. stepped up to the steam condenser, placed a cylindrical object in a tube, set his gun and—bang—the object went sailing out the other side.

With it went accumulated scale and foreign matter that gradually build up as cooling water passes through—deposits that shorten a condenser's life and raise fuel costs.

The device was one of the most unusual brushes ever made, specially designed for cleaning power-plant condensers. It is bristled with nylon and a little wire.

Used for more than two years now by Newport Electric, these novel brushes are outlasting their predecessor by about four lifetimes. Says a mechanical engineer for that company, "They give better cleaning action. This aids materially in keeping condenser efficiency at the highest possible level."

Photo: Revere Copper and Brass Inc.

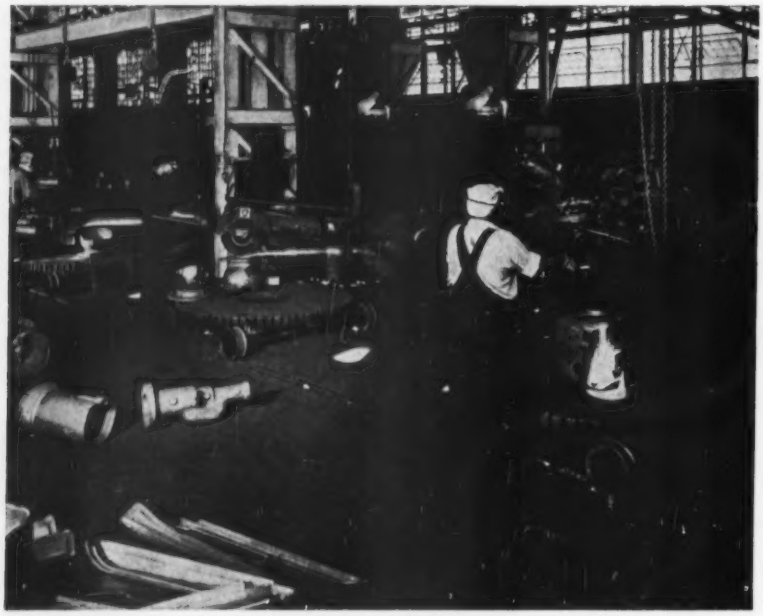
Workman uses compressed air to drive bristled object through condenser tube

This user is perhaps even more concerned with efficient scale removal than many other power plants, for it draws on harbor water. This means that, as in all seashore installations, large amounts of algae and other marine organisms are present to make trouble.

The nylon-bristled brushes do not seem to be bothered by the extra deposits. They clean them out to an extent engineers once believed impossible, each brush lasting for about a year.

From power plants to textile mills to canneries, nylon bristles are giving industry the happiest brush-off it ever had. *From Du Pont Magazine, published by E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.*

Turntables on Wheels Help Position Castings for Grinding



Castings at the foundry of the National Erie Corporation of Erie, Pa., are carried on small turntable cars. This idea permits the operators of swing grinders to readily position their work. Lifting by overhead cranes is thus held down to a minimum. (From Kreolite News, published by the Jennison-Wright Corp., Toledo)

Friction Within Bearings

IN SPITE of the fact that in theory ball and roller bearings only have point and line contact respectively between bearing and race, this is never true in service. There is always some deformation of both bearing and race when the bearing comes under any load, and obviously this deformation will increase with increase of load.

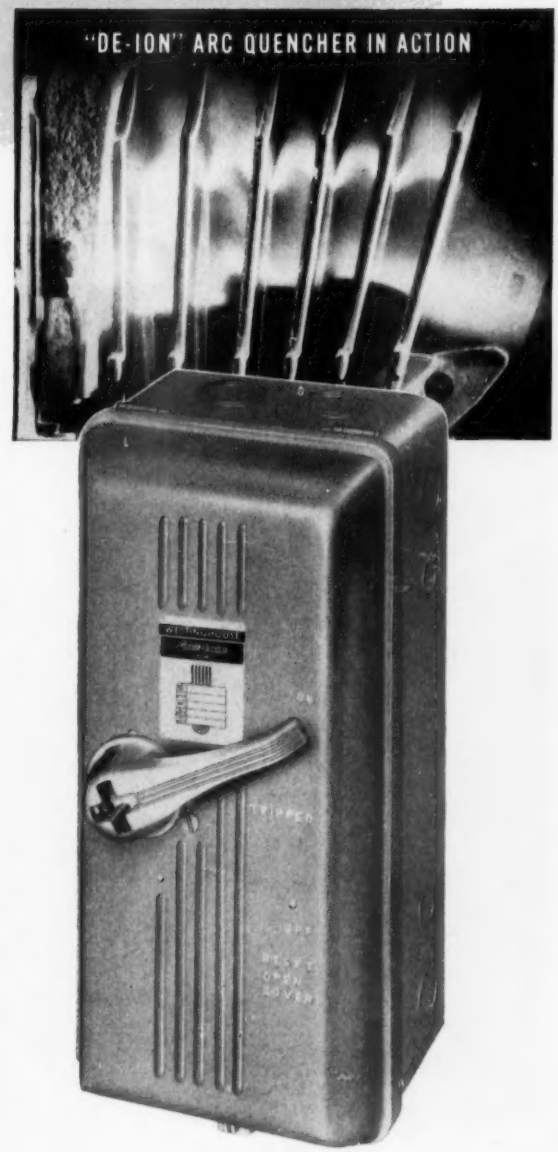
This deformation may be so slight that it cannot be discerned with a microscope, but it will, nevertheless, be sufficient to cause frictional resistance to rolling.

The interposition of a film of lubricant may reduce this friction, but the pressures between the surfaces in contact will be very high. Nevertheless, even if the film of lubricant does not reduce frictional resistance, it will certainly help to reduce wear.

In the case of spherical races, the frictional resistance caused by the

No unnecessary circuit interruptions...

WITH AB-I CIRCUIT BREAKERS



You can't fool the protective trip elements of Westinghouse AB-I Circuit Breakers. Harmless peak, momentary heavy or prolonged light overloads are carried without incident. But, let a short or dangerous overload strike and the tripping element instantly opens all poles.

"De-ion®" Arc Quenchers cut up and quench arcs that follow tripping in less than 1/120 of a second to complete the protective job.

For lasting accuracy, each Bi-metal is calibrated precisely for its rating . . . tested and sealed to prevent tampering before it leaves our plant. Calibration stays exact for the life of the installation.

With AB-I Circuit Breakers there are no replacement elements to fuss with. After a fault is cleared anyone can "Reset" an AB-I Breaker in seconds with a flip of the handle. AB-I Breakers cannot be held or locked "On" against a fault.

Get the complete facts on AB-I Breaker protection. Call your Westinghouse Representative or write for B-5456, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-30100

YOU CAN BE SURE...IF IT'S
Westinghouse
APPARATUS DISTRIBUTOR
AB-I *Circuit Breakers*
THE COMPLETE LINE

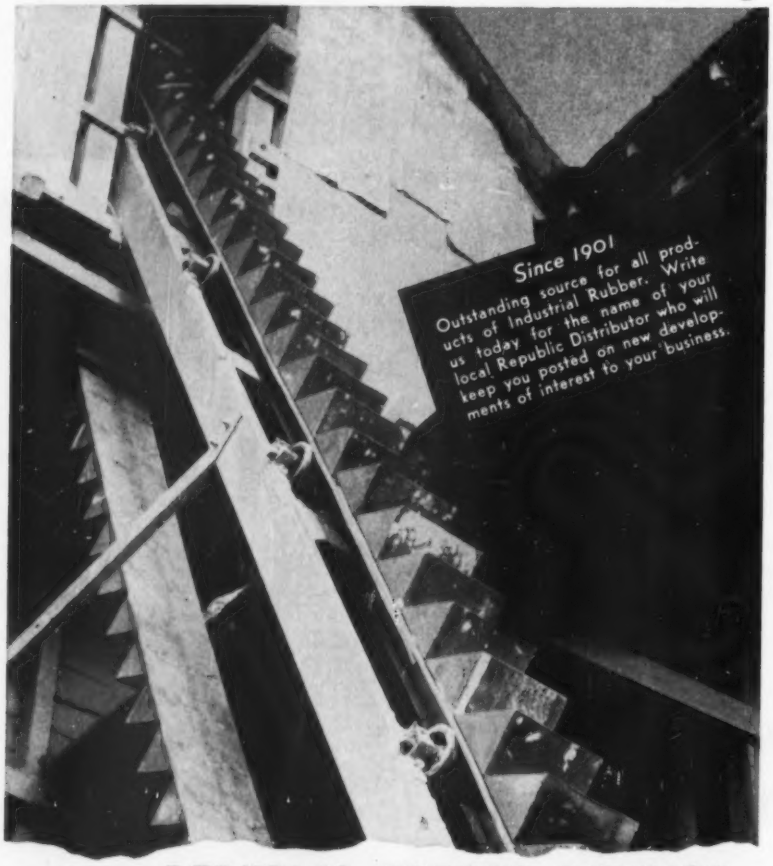
"Of course, circuit breakers save money."

For more facts circle 525 on Reply Card

endurance test record PROOF:

● Every belt tested had an equal chance to perform. It was a primary crusher installation at a large Southern quarry. A tough job, and, an important one, because a breakdown here meant work stoppage in the entire plant. Performance of ordinary belts varied. Some lasted longer than others, but not one approached the record made by Republic's EXCELO Elevator Belting. This rugged belt outlasted all the others. It worked steadily for a two-year period without a single breakdown. It required less maintenance, showed less signs of wear, did far more work at less cost than was previously thought possible! Republic Elevator Belts chalk up performance records like this everywhere they're used. Republic Elevator Belts are expertly matched to your job by local men who really know your specific problems. So, don't gamble on results. It costs less to use the best . . . REPUBLIC ELEVATOR BELTING!!

Republic builds toughest Elevator Belts going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PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

deformation is greater than in flat races, but in view of the fact that spherical races will usually carry up to double the load of flat races, they are very frequently used.

The coefficient of sliding friction varies considerably with changes in load and speed of bearings, and is also affected by both the oiliness and viscosity of the lubricant. The coefficient of rolling friction, i.e. the friction if no sliding occurs, is only slightly affected by these variables.

Sliding friction occurs between balls and rollers and cage pockets and it is here that a lubricant will be most valuable. Roller bearings revolve at greater speeds than their cage and cause rubbing friction between rollers and the end of the cage. The cage may also rub against the bearing housing.

To illustrate this point, the case of a medium type roller bearing to suit a 3 in. dia shaft running at 3,000 rpm can be considered. In this, the relative rubbing speed between the outside diameter of the inner race and the bore of the cage is over 2,000 fpm. The rubbing speed between the rollers and the cage pockets is just under 3,000 fpm. So, it is obvious that these surfaces will have to be efficiently lubricated. *From Scientific Lubrication, published by Scientific Publications, Wellington Shropshire, England.*

Magnetic Grinding Chuck Refinishing

SOME SCRATCHING, denting, and wearing of a chuck face is inevitable. As soon as it becomes serious enough to affect the accuracy of grinding, the chuck should be reconditioned by grinding. Light burrs can be removed by hand stoning, using a medium India oilstone.

For regrinding the chuck, use a soft grade, very free-cutting wheel dressed openly. With a cup, cylinder or segmented type wheel, the grit size should not be any finer than 24 or 30; with peripheral type wheel, a finer grit size such as 46 is necessary.

Take light cuts, use a slow chuck speed, plenty of coolant and grind off no more than is necessary to restore a clean, true surface.

It should not be necessary to remove more than .001 in. or .002 in. to clean up the chuck face. If more than this amount has to be removed, rough dress the face of the wheel just before finishing.

(Continued on page 38)

with BENJAMIN'S complete line there is no trouble *at all* getting

Task Matched Lighting Installations

In the 400-page Benjamin Catalog, you'll find just the lighting equipment you need to provide lighting that is matched to the task.

No need wasting time trying to locate a source for this or that special unit . . . or figuring out an acceptable substitute. If the unit is needed in industrial and utilitarian lighting . . . you'll be sure to find it in the Benjamin Line!

You'll be sure to find that, not only is the unit you select correct in lighting design, but equally important, it is designed for extra long life operation under the special operating conditions for which it is intended. Whether it be for ordinary industrial use, installation in corrosive, dusty or explosive atmospheres, for indoor lighting or outdoor . . . the Benjamin Unit designed for the task can be depended upon to meet highest expectations for finest performance.—Benjamin Electric Mfg. Co., Dept. PE, DesPlaines, Ill.

"MAGNA-FLO" SYSTEMS

Provide Over 300 Combinations for Matched to the Task Lighting.

Like all Benjamin Lighting Systems, the "Magna-Flo" line for use with the three T12 Slimline Lamps is complete! It is so complete because, basically, just three channel sizes and four types of reflectors form the backbone of almost unlimited systems to match any industrial lighting task.

R-5930E

"VAPOLETS"

For locations with atmospheres containing moisture, non-hazardous dusts or vapors.

Available in three types of reflectors—Dome, Shallow Dome and Symmetrical Angle. These reflectors thread on to the vapolet housing by cast-iron ring. Choice of glass globes: plain, opal, heat-resisting, ruby, etc.

EXPLOSION-PROOF

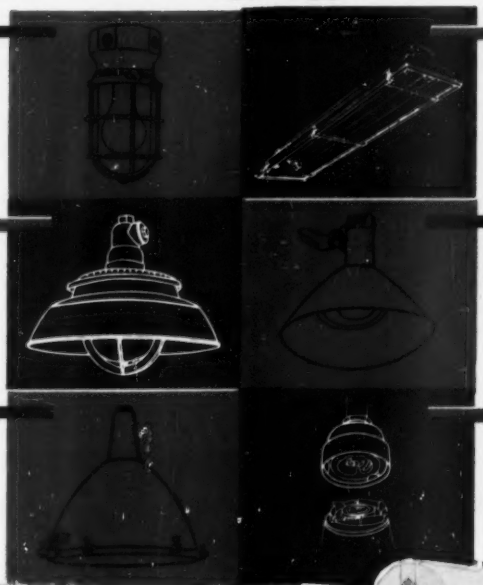
For locations listed by U. L. as Class I, Group C and D hazardous locations.

For lighting locations involving explosive atmospheres or explosive inflammable dusts, there is a complete line of Benjamin Explosion-Proof Units, available in a choice of reflectors, Dome, Flat Cone, Bowl, Symmetrical Angle; also choice of mountings.

"STEELITES"

For locations where keeping lighting levels up and upkeep down is a real problem.

An armor-clad unit consisting of specially designed alzak aluminum reflector enclosed in a protective steel housing and a hinged, tempered glass cover which seals against dust, moisture and corrosive fumes.



"VAPOR-TITE" FLUORESCENT

For lighting locations where excessive amounts of non-combustible vapor or dust are present.

Approved as vapor tight by U. L., a one-piece porcelain enameled unit with hinged glass cover and easily accessible control equipment. Available in standard and angle mountings; also Plexiglass covers.

"ELLIPTO-LITE"

Most popular type floodlight ever designed for outdoor and protective floodlighting.

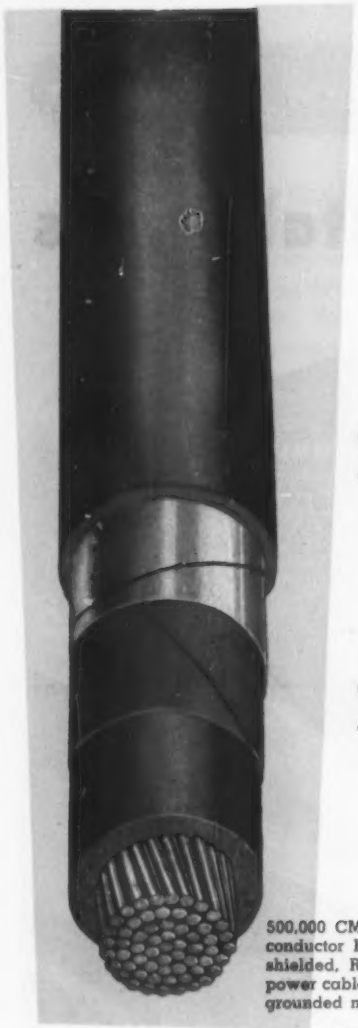
For protective floodlighting of factory yards and grounds and for lighting outdoor work areas. A porcelain enamel floodlight with auxiliary inner aluminum reflector; available with a removable hood construction, lowering attachment, choice of mountings.

"TURNLOX"

Detachable Hood Construction available with 7 types of Incandescent Reflector Units to speed maintenance and cut costs.

Permits removal of lamp and reflector as one unit for cleaning on floor or at bench.

For complete details on this equipment or any of the more than 2,000 Benjamin Lighting Units CONSULT YOUR BENJAMIN CATALOG . . . the encyclopedia of industrial Lighting.



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Rome RoZone®

This Superior Ozone-Resistant Insulation Deserves Your CONFIDENCE

Q: WHAT IS ROZONE?

A: A PREMIUM quality, ozone-resistant, oil-base type insulation developed by Rome Cable research, exceeding *all* requirements of ASTM specification D-574. RoZone is exceptionally resistant to corona action and aging. It shows high electrical stability in water and possesses excellent electrical characteristics. While the preferred outer covering is a RoPrene (Neoprene) sheath, RoZone insulation can be supplied with either braided or lead sheath coverings. In addition, on shielded types of cable, a special thermoplastic sheath is available.

Q: WHERE IS ROZONE USED?

A: Rozone is recommended for all specialized or general purpose wiring where long-time dependability is paramount. It is particularly suitable for higher voltages up to 15 KV. With proper sheath protection, RoZone is widely used for high voltage underground and aerial power distribution, street lighting circuits, signal and control cables, as well as for low-voltage power requirements where conditions of moisture or heat are present.

Q: WHAT DO ROZONE TESTS SHOW?

A:
1. High resistance to aging. Longevity of original characteristics.
2. On the basis of long-time test, dielectric strength exceeding 400 volts per mil, for 5,000 volt services. Surge or impulse strength proportionately high.
3. Utmost resistance to corona and ozone cutting.
4. Low dielectric loss.
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BULLETINS just released and of immediate plant interest

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104 Permanent-Magnet Motors — Bulletin F-4344 describes and pictures permanent-magnet motors with electrically balanced armatures to insure low radio noise level, higher efficiency and longer brush life. Tells adaptations. Barber-Colman Co.

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INSTRUMENTS, CONTROLS

110 Dampers and Operators—Catalog 8502, 12 pp, describes louver, round, mixing, outlet and fire dampers for regulation of air flow in industrial applications; also electric, pneumatic and manual damper operators. Includes application data, velocity-pressure drop charts, and damper ratings for operators. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

111 Metering Applications—Twenty-pp Booklet GET-1905 describes applications for watthour meters. Contains circuit wiring diagrams for various applications. Also describes watthour-meter constants and register data, the determination of watts load, and the use of watthour meters with instrument transformers. General Electric Co.

112 For Temperature-Humidity Testing—Bulletin TR covers test chambers for simulating temperatures from -100 to 200 F and relative humidities from 20 to 95 per cent. Gives data on heaters, humidification, de-humidification, controllers, compressor equipment, insulation, exterior construction and optional equipment. Tenney Engineering, Inc.

MATERIALS HANDLING

114 The Materials Handling Picture—This 8-pp comprehensive survey on materials handling is part of a cost reduction training program. Among subjects covered are principles, equipment, changing of existing methods, planning of new layouts, warehousing and storage, increased capacity, product protection, safety, increased efficiency. Wheeler-Brady, Inc.

116 Hydraulic Lift Trucks—All standard models of this company's line of hydraulic lift trucks are illustrated and described in Bulletin 207. Specifications and explanations of the special features of each model are given, covering lift trucks, pallet trucks and high lifts. The Raymond Corp.

117 Lifts and Skids—Bulletin 1149 provides 8 pp of descriptive and application information on a variety of hydraulic lift trucks and skid platforms. Gives specifications, tells special features of each model. Also pictures special handling equipment. West Bend Equipment Corp.

118 For Horizontal Handling—This 8-pp bulletin features manufacturer's Turret trucks, low cost economy units for moving any material or merchandise that can be palletized, handled on skids, in tote boxes or loaded on a platform. Specifications included. Hyster Co.

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January, 1953

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CONSTRUCTION AND MAINTENANCE

119 Roofing and Siding Manual—Complete data and specifications for manufacturer's Careystone corrugated asbestos-cement roofing and siding are presented in 82-pp Manual 52. Includes numerous drawings and photos showing method of application and erection. Application recommendations, shipping and crating information are provided and estimating and engineering services described. Additions and changes in specifications will be supplied to holders of this manual. Available to qualified plant engineers. The Philip Carey Mfg. Co.

120 Modern Metal Windows—This newly released 1953 catalog offers 16 pp of illustrated data on aluminum projected windows and projected ribbon windows, types growing in favor for use in the more modern architectural treatments. Following a discussion of features, booklet provides specifications, dimensions and installation details. The William Bayley Co.

121 Vision Strips—"A Study of Vision Strips as Related to Glass Block Fenestration" is a 40-pp illustrated report of a test project dealing with various solutions to daylight control problems arising from the use of vision strips. Fourteen schemes are presented covering three approaches to the problem — landscaping, architecture and manufactured products. Kimble Glass Co.

122 Luminous Ceiling — A ceiling designed to integrate glare-free illumination with effective sound control and to become an integral part of the over-all design of the room is presented in this 34-pp brochure. Explains concept of total luminous environment and the role played by the ceiling. Shows how sound control is integrated with light source by means of perforated acoustical baffles. Describes structural and electrical system, diffusing and acoustical system. Discusses this ceiling in new construction, in remodeling work. The F. W. Wakefield Brass Co.

123 Metal Framing Guide—Although pocket-sized, 80-pp Catalog 800 is packed with clearly-illustrated information on an all-purpose metal framing system, and serves as a handy reference text. Fully indexed, this practical booklet shows the versatile basic channel, suggests possible combinations and pictures typical fittings and parts. Provides design and application data and pictures some of the almost unlimited uses for this framing system. Includes reference tables. Unistrut Products Co.

124 Building with Plastic Sheet—This folder describes use of Plexolite, a Fiberglas reinforced translucent sheet. Gives technical data on the sheets, along with illustrated breakdown of standard types and stock sizes. Plexolite Corp.

125 For Wood Users—Prepared for users of wood and forest products, this 12-pp catalog lists a variety of timber connectors and tells briefly where each is used to advantage. These include split rings, shear plates, toothed rings, spike grids, clamping plates and framing anchors, and proper installation tools for each are prescribed. Timber Engineering Co.

126 Shelving as Needed — Twenty-pp Catalog S-300 presents a wide line of adjustable steel shelving. An almost unlimited number of combinations of types, sizes and accessory parts can be selected because of the design flexibility of the shelving and interchangeability of parts. Specifications, ordering information and typical installations are included, also suggestions on how to save time, labor and space. Penn Metal Corp. of Penna.

127 Corrosion-Proof Cements—Excellent selection and application information on four corrosion-proof cements is provided in 12-pp Bulletin 5-2. Tells requirements of good cements, and covers in detail a silicate-base cement for use with oxidising and non-oxidising acids; a furane resin cement described as a near approach to a universal corrosion proof type; a plasticised sulfur base cement for non-oxidising acids; and a phenolic base resin cement for non-oxidising acids. Fully illustrated. Atlas Mineral Products Co.

129 Plastic Paints—Sixteen-pp Bulletin 730 describes Tygon plastic paints formulated to give longer lasting protection for surfaces exposed to attack by acids, alkalies, oils, water and alcohol. Discusses chemical resistance, other advantages of these paints, also gives information on Tygorust, a vinyl primer. Tells where and where not to use these preparations. Provides chemical-resistance charts and a chart of recommended primers and surface treatments. The U. S. Stoneware Co.

TOOLS

130 Tools of Industry — Seventy-pp Catalog 301 is the new edition of manufacturer's ordering book for a broad line of tools. Presents clamps, lathe dogs, tool holders, pipe tongs and vises, many types of wrenches and other tools. Tools are pictured along with sizes, weights and brief text on where to use them to advantage. Includes handy comparison chart showing new and old American standard square and hexagon bolts and nuts as related to wrench openings. J. H. Williams & Co.

131 Twist Drills—Form 51-316 is a 16-pp catalog on twist drills covering a variety of types. All styles in jobber's length drills are offered in fractional, letter and wire sizes and ordering data are given for each size classification. Also lists drill sets, drill and reamer blanks, countersinks, sleeves, holders. Includes instruction on drill pointing, web thinning. The DoAll Co.

132 Safety Marking Tools—Over 100 marking tools and devices are described and pictured in 28-pp Catalog 100. Includes photos, descriptive material, and size charts. Also gives information on a specially-developed alloy said to reduce spalling and mushrooming and increase marking life. M. E. Cunningham Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

134 For Quick Valve Selection—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated and thumb indexed, includes pressure-temperature chart. The Ohio Injector Co.

135 Bonnet Valves—Form AD-1902, 8 pp, presents manufacturer's Lip-Seal steel bonnet valves, 1500- and 2500-lb globe and angle types for power services. Shows how their design meets requirements for high-pressure/high-temperature power plant service, gives construction details, pictures some installations. Includes tables of materials and service ratings, sizes and dimensions. Crane Co.

136 Compressor Valve—Bulletin 203B describes and illustrates company's Air-chek valve for discharge lines of air and

(Continued on page 165)

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INSTRUMENTS, CONTROLS

110 Dampers and Operators—Catalog 8302, 12 pp, describes louver, round, mixing, outlet and fire dampers for regulation of air flow in industrial applications; also electric, pneumatic and manual damper operators. Includes application data, velocity-pressure drop charts, and damper ratings for operators. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

111 Metering Applications—Twenty-pp Booklet GET-1905 describes applications for watthour meters. Contains circuit wiring diagrams for various applications. Also describes watthour-meter constants and register data, the determination of watts load, and the use of watthour meters with instrument transformers. General Electric Co.

112 For Temperature-Humidity Testing—Bulletin TR covers test chambers for simulating temperatures from -100 to 200 F and relative humidities from 20 to 95 per cent. Gives data on heaters, humidification, de-humidification, controllers, compressor equipment, insulation, exterior construction and optional equipment. Tenney Engineering, Inc.

MATERIALS HANDLING

114 The Materials Handling Picture—This 8-pp comprehensive survey on materials handling is part of a cost reduction training program. Among subjects covered are principles, equipment, changing of existing methods, planning of new layouts, warehousing and storage, increased capacity, product protection, safety, increased efficiency. Wheeler-Brady, Inc.

116 Hydraulic Lift Trucks—All standard models of this company's line of hydraulic lift trucks are illustrated and described in Bulletin 207. Specifications and explanations of the special features of each model are given, covering lift trucks, pallet trucks and high lifts. The Raymond Corp.

117 Lifts and Skids—Bulletin 1149 provides 8 pp of descriptive and application information on a variety of hydraulic lift trucks and skid platforms. Gives specifications, tells special features of each model. Also pictures special handling equipment. West Bend Equipment Corp.

118 For Horizontal Handling—This 8-pp bulletin features manufacturer's Turret trucks, low cost economy units for moving any material or merchandise that can be palletized, handled on skids, in tote boxes or loaded on a platform. Specifications included. Hyster Co.

The Reader Service Card below needs no postage. Just circle item numbers of all bulletins wanted, fill in name etc., detach and mail. There's another card on page 165.

January, 1953

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PLANT ENGINEERING

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Use this space to ask for tear sheets, other information wanted.

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CONSTRUCTION AND MAINTENANCE

119 Roofing and Siding Manual—Complete data and specifications for manufacturer's Careystone corrugated asbestos-cement roofing and siding are presented in 82-pp Manual 52. Includes numerous drawings and photos showing method of application and erection. Application recommendations, shipping and crating information are provided and estimating and engineering services described. Additions and changes in specifications will be supplied to holders of this manual. Available to qualified plant engineers. The Philip Carey Mfg. Co.

120 Modern Metal Windows—This newly released 1953 catalog offers 16 pp of illustrated data on aluminum projected windows and projected ribbon windows, types growing in favor for use in the more modern architectural treatments. Following a discussion of features, booklet provides specifications, dimensions and installation details. The William Bayley Co.

121 Vision Strips—"A Study of Vision Strips as Related to Glass Block Fenestration" is a 40-pp illustrated report of a test project dealing with various solutions to daylight control problems arising from the use of vision strips. Fourteen schemes are presented covering three approaches to the problem — landscaping, architecture and manufactured products. Kimble Glass Co.

122 Luminous Ceiling — A ceiling designed to integrate glare-free illumination with effective sound control and to become an integral part of the over-all design of the room is presented in this 24-pp brochure. Explains concept of total luminous environment and the role played by the ceiling. Shows how sound control is integrated with light source by means of perforated acoustical baffles. Describes structural and electrical system, diffusing and acoustical system. Discusses this ceiling in new construction, in remodeling work. The F. W. Wakefield Brass Co.

123 Metal Framing Guide—Although pocket-sized, 80-pp Catalog 800 is packed with clearly-illustrated information on an all-purpose metal framing system, and serves as a handy reference text. Fully indexed, this practical booklet shows the versatile basic channel, suggests possible combinations and pictures typical fittings and parts. Provides design and application data and pictures some of the almost unlimited uses for this framing system. Includes reference tables. Unistrut Products Co.

124 Building with Plastic Sheet—This folder describes use of Plexolite, a Fiberglas reinforced translucent sheet. Gives technical data on the sheets, along with illustrated breakdown of standard types and stock sizes. Plexolite Corp.

125 For Wood Users—Prepared for users of wood and forest products, this 12-pp catalog lists a variety of timber connectors and tells briefly where each is used to advantage. These include split rings, shear plates, toothed rings, spike grids, clamping plates and framing anchors, and proper installation tools for each are prescribed. Timber Engineering Co.

126 Shelving as Needed — Twenty-pp Catalog S-300 presents a wide line of adjustable steel shelving. An almost unlimited number of combinations of types, sizes and accessory parts can be selected because of the design flexibility of the shelving and interchangeability of parts. Specifications, ordering information and typical installations are included, also suggestions on how to save time, labor and space. Penn Metal Corp. of Penna.

127 Corrosion-Proof Cements—Excellent selection and application information on four corrosion-proof cements is provided in 12-pp Bulletin 5-2. Tells requirements of good cements, and covers in detail a silicate-base cement for use with oxidising and non-oxidizing acids; a furane resin cement described as a near approach to a universal corrosion proof type; a plasticized sulfur base cement for non-oxidising acids; and a phenolic base resin cement for non-oxidising acids. Fully illustrated. Atlas Mineral Products Co.

129 Plastic Paints—Sixteen-pp Bulletin 730 describes Tygon plastic paints formulated to give longer lasting protection for surfaces exposed to attack by acids, alkalies, oils, water and alcohol. Discusses chemical resistance, other advantages of these paints, also gives information on Tygorust, a vinyl primer. Tells where and where not to use these preparations. Provides chemical-resistance charts and a chart of recommended primers and surface treatments. The U. S. Stoneware Co.

TOOLS

130 Tools of Industry — Seventy-pp Catalog 301 is the new edition of manufacturer's ordering book for a broad line of tools. Presents clamps, lathe dogs, tool holders, pipe tongs and vises, many types of wrenches and other tools. Tools are pictured along with sizes, weights and brief text on where to use them to advantage. Includes handy comparison chart showing new and old American standard square and hexagon bolts and nuts as related to wrench openings. J. H. Williams & Co.

131 Twist Drills—Form 51-316 is a 16-pp catalog on twist drills covering a variety of types. All styles in jobber's length drills are offered in fractional, letter and wire sizes and ordering data are given for each size classification. Also lists drill sets, drill and reamer blanks, countersinks, sleeves, holders. Includes instruction on drill pointing, web thinning. The DoAll Co.

132 Safety Marking Tools—Over 100 marking tools and devices are described and pictured in 28-pp Catalog 100. Includes photos, descriptive material, and size charts. Also gives information on a specially-developed alloy said to reduce spalling and mushrooming and increase marking life. M. E. Cunningham Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

134 For Quick Valve Selection—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated and thumb indexed, includes pressure-temperature chart. The Ohio Injector Co.

135 Bonnet Valves—Form AD-1902, 8 pp, presents manufacturer's Lip-Seal steel bonnet valves, 1500- and 2500-lb globe and angle types for power services. Shows how their design meets requirements for high-pressure/high-temperature power plant service, gives construction details, pictures some installations. Includes tables of materials and service ratings, sizes and dimensions. Crane Co.

136 Compressor Valve—Bulletin 802B describes and illustrates company's Air-chek valve for discharge lines of air and

(Continued on page 165)

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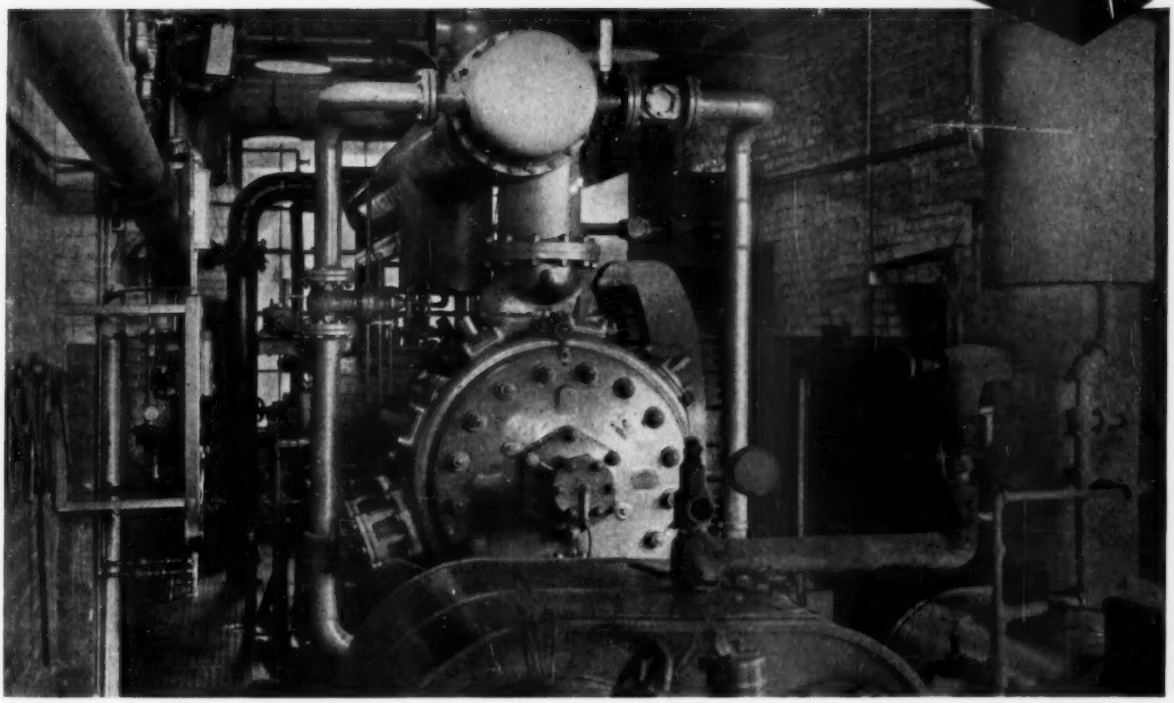
Is available floor space holding back expansion of your plant air facilities?



Haven't got the floor space for additional plant air facilities? Don't be too sure!

How about the nooks and crannies, or right in among your machine tools? Other plants are squeezing Clark Balanced/Opposed Compressors in many such "impossible" places. The above illustration, in an aluminum forging plant, is a typical example. Here a 600 hp, 3200 cfm Clark unit was squeezed into a 20 x 13 ft. floor area.

It's a fact that a Clark Balanced/Opposed Compressor can be moved in anywhere. One of the reasons is its compactness. Another is its absolutely vibration-free performance. You can set it in a corner, on a second floor, or alongside even the most delicate of machining operations. The savings in building, piping and installation costs are considerable.

For full information on this modern, motor-driven compressor (150 - 4500 hp range), request Bulletin 118, or call your nearest Clark representative.

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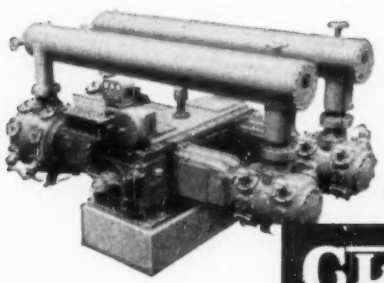

PRECISION BY THE TON . . .

CLARK balanced/opposed compressors

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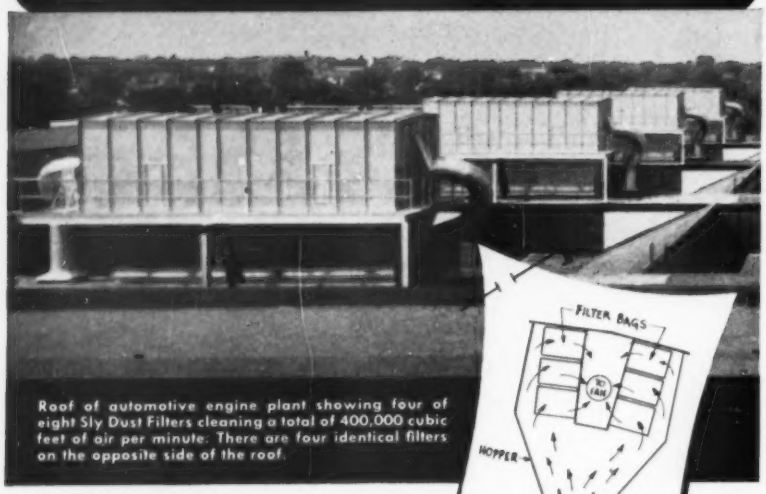
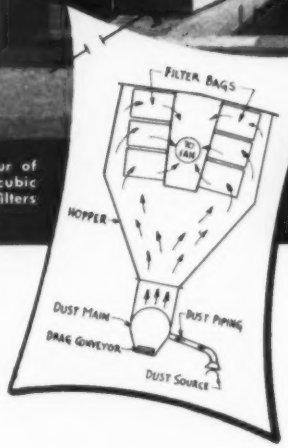
For more facts circle 529 on Reply Card

SLY PIONEERS & LEADERS

INDUSTRIAL DUST CONTROL



Roof of automotive engine plant showing four of eight Sly Dust Filters cleaning a total of 400,000 cubic feet of air per minute. There are four identical filters on the opposite side of the roof.



DUST...

RECLAIMED—
RE-MELTED—
RE-USED

Here are four of the eight Sly Dust Filters which exhaust the dust from milling machines in a large automotive engine plant.

Dust from machining engine blocks and other operations, is exhausted into hoods over the machines, thence into mains and through the hoppers into the filters; the collected dust drops into hoppers thence into the mains and is re-claimed —briquetted, and re-melted.

Aside from the recovery of valuable materials, the use of Sly Dust Filters results in a clean plant and better working conditions.

Because of their larger filtering capacity and easy replacement of bags, Sly Dust Filters offer definite advantages in economy of operation and lower maintenance.

If you will tell us your dust problem we shall be glad to tell you what can be done about it and give you an estimate of cost.

THE W. W. SLY MANUFACTURING CO.

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New York • Chicago • Philadelphia • Syracuse • Detroit • Buffalo
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PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

By marking the chuck with red lead or Prussian blue, it is a simple matter to tell when the wheel is contacting and the chuck has been ground all over.

The ground surface should be dull rather than polished, should show the grain marks plainly, and should be free from any burned, glazed or spotty appearance.

Test the flatness of the chuck with a straight edge placed across the center, or with an indicator fastened to the wheel or wheel guard. *From Grits and Grinds, published by Norton Company, Worchester 6, Massachusetts.*

Winter Ore Freezeproofing

SINCE 1950 the water shipments of iron ore have had to be supplemented by continuous winter rail shipments from the mines in the northern lake areas to the mills to meet the demand for steel.

The all rail shipment created a problem. The material had to be sufficiently freezeproofed at extremely low temperatures so that it could be readily unloaded at destination.

The ore, as it comes from the mine, normally contains 11 to 13 per cent total moisture. The surface moisture which freezes and forms a solid mass is less than half of the total moisture of the ore.

Thus the problem is to get the calcium chloride thoroughly distributed in the mass of ore to reduce the freezing point of the surface solution to a safety level.

With calcium chloride it is possible to prevent freezing to –60 F while sodium chloride will give protection only to slightly below 0 F.

The cost of handling frozen ore at the mill is several times the cost of calcium chloride treatment. This is usually done with steam. It is forced

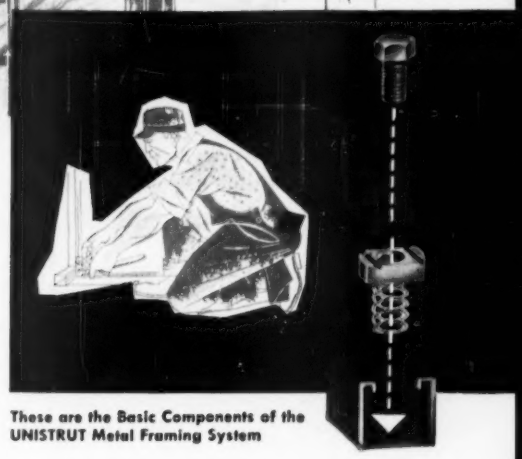
Cars are loaded with ore that has been freezeproofed for trip to the mills

for the MAN ON THE JOB!

84 pages crammed with ideas, pictures and data on how to frame, hang, support and mount all kinds of mechanical and electrical equipment with adjustable UNISTRUT All-purpose Metal Framing.

Perfect for the man on the job—most useful, too, as a handy reference catalog for the architect, engineer, draftsman, contractor, or builder. Just pocket size, easy to handle, always within reach when you want it. Order your free copy of the *NEW* UNISTRUT Catalog No. 800 today! With UNISTRUT channel and fittings you can build all types of conduit, cable, pipe and tubing hangers and supports, framing, mounts, racks, tables, benches, and many other structures with just a hacksaw and a wrench. No drilling, no welding, 100% adjustable and re-usable.

The UNISTRUT system of mechanical supports provides great strength without bulk. It's easy to work with, lasts indefinitely, and the finished structure assures neat and orderly appearance.



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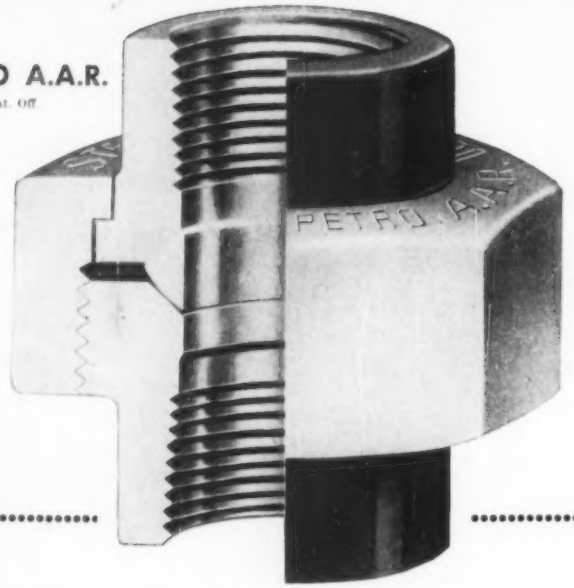


"PETRO A.A.R." Hot Forged of A. I. S. I. 1023 Open Hearth "Killed" Steel—For temperatures from 100° below zero F. to 1000° above zero F. A differential of 40 points (brinell) in hardness is maintained between the male and female seats to prevent seizure of seats at high temperatures.

Nut threads are permanently lubricated with Udylite Cadmium (plated). "PETRO A.A.R." screwed and "PETRO A.A.R." Socket-weld are recommended for severe service on ammonia, air, gas, oil, steam, and water, and for general industrial and oil refinery maintenance.

CLAYTON MARK & COMPANY FORGED STEEL "ORIFICE" UNIONS, SCREWED, OR SOCKET-WELD

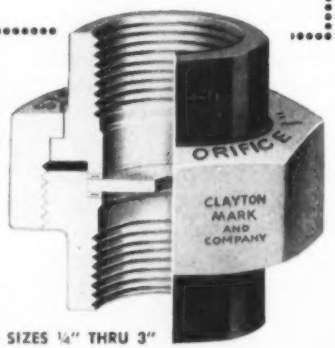
For flow control of steam, oil, ammonia, chemicals, water, gas, air. Also for metering and measuring.

Recommended for working pressures of 600 lbs. at 900° F., or 3000 lbs. at 150° F.

Furnished with type 304 stainless steel orifice plate and steel-jacketed asbestos filled gaskets.

The orifice plate and gaskets are set in a groove of solid steel to facilitate ease of tightening and safeguard against blowing of gaskets and resultant trouble.

Nut threads of the union are Cadmium plated (Udylited) for permanent thread lubrication.



SIZES ¼" THRU 3"

For additional information about these and other Forged Steel Unions write Department P. for Illustrated Catalog or refer to listings in Composite Catalog pages 3194-3195, Refinery Catalog page 695 and Chemical Engineering Catalog pages 1294-1295.

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PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

into lances with shafts of perforated steel piping.

Reports indicate that the steam and labor cost on such operations exceeds a dollar a ton in cold weather. *From Dowflakes, published by the Dow Chemical Company, Midland, Michigan.*

Coil Rides Rolls for Strapping

This idea of using radial rolls and a triangular offset to permit easy handling of heavy wire coils originated with a Roebling employee. (From The Roebling Record, published by John A. Roebling's Sons Co., Trenton, N. J.)

Iron-Rich Powder in Blowpipe Helps Cut Stainless

A NEW POWDER-CUTTING process, makes it possible to cut stainless steel, high-alloy steels, and cast iron with oxy-acetylene apparatus as easily as ordinary carbon steel.

In this process, a fine iron-rich powder is introduced into the cutting oxygen stream. The powder burns when it meets the oxygen and gives off a great amount of heat. This "fluxes" the oxide, which does not melt in an ordinary oxy-acetylene flame. With this additional help, the oxygen jet readily cuts into oxidation-resistant metals.

The heads of the blowpipes used in this process are sand cast from an alloy which resists the severe heat, corrosion, and abrasion in-

Blowpipe using iron-rich powder is cutting riser on stainless steel casting

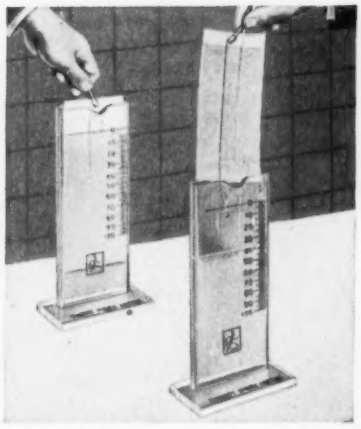
ScotTissue Towels save more because they do more

One towel dries both hands, saving time, towels, and maintenance

SAVE TIME!
Since one ScotTissue Towel dries both hands quickly, there are less washroom "traffic jams." Workers are able to get back to their jobs a lot faster.

SAVE TOWELS!
Employees appreciate famous ScotTissue Towels—they're softer and stronger than ever—compare them against any other paper towel or service. Fewer ScotTissue Towels used means all-around savings.

SAVE MAINTENANCE!
With fewer ScotTissue Towels used, less storage space, and less servicing of dispensers and receptacles is required—reducing janitor costs. That's why companies who "slide-rule" costs prefer them.



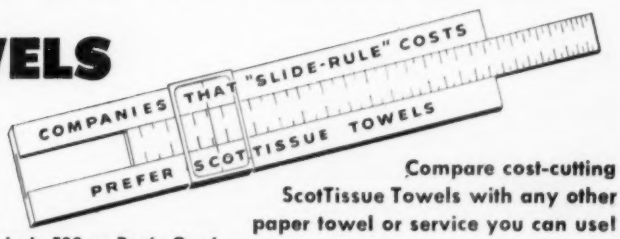
HERE'S PROOF!
In the "Thirsty Fibre" Meter Test, a ScotTissue Towel is immersed in water for 20 seconds. You see its quick absorption and great water retention—another reason why fewer are used per employee per year.

The right kind of washroom is one of the four most important essentials in good working conditions—according to a survey of employees from 400 plants.

Take advantage of our unique Washroom Advisory Service. We'd be glad to give you tested plans and specific suggestions for improving your washrooms. And if you would like a personal demonstration of cost-cutting ScotTissue Towels—the "Thirsty Fibre" Test—just write us on your company's letterhead. Address: Washroom Advisory Service, Scott Paper Company, Chester, Pa.

SCOTTISSUE TOWELS

Symbol of the right kind of washroom



Compare cost-cutting ScotTissue Towels with any other paper towel or service you can use!

"ScotTissue," "Thirsty Fibre," "Washroom Advisory Service," Reg. U.S. Pat. Off.

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Can YOU Do This?

● Do your slings give maximum safety in handling the 101 odd loads that your crane moves daily? A combination of ACCO *Registered* Wire Rope Slings, as shown above, can be used safely because all fittings and attachments have full rope strength.

The DUALOC Ending produces the strongest wire rope sling made. Two collars insure uniform strength from sling to sling. Actual strength certified by warranty certificate. Preformed improved plow steel Green Strand wire rope with steel core assures maximum resistance to kinking.

Popular sizes in stock for immediate delivery.

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Registered Wire Rope Slings

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PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

volved in the cutting of stainless.

Since the abrasive powder passes through the head at fairly high velocity and changes direction before leaving the blowpipe, heads made from ordinary metals would rapidly be eroded to destruction in this application. *From Haynes Alloys Digest, published by Haynes Stellite Company, Kokomo, Indiana.*

Metal Reclaimed from Dross

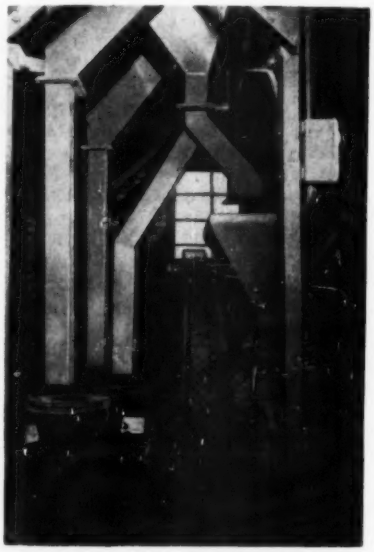
VALUABLE METAL is being reclaimed from dross at the Non-Ferrous Die Casting Co. of Cricklewood, London, by using a system consisting of a pair of crushing rollers and bucket elevator, with a rotary tumbling screen. The simple and compact plant is the first of its type in the world.

Dross is fed into the machine through a hopper covered at the top with ¾ in. mesh grid. Above the hopper is a dust extracting unit worked by suction. The grid screens out the larger pieces of metal.

The remaining dross which passes through the grid is delivered in a steady flow to the crushing rollers by an automatic feeder. The distance between the rollers, which are 5 in. long and 8 in. in dia is adjustable but they are normally set from ¼ in. to ½ in. apart.

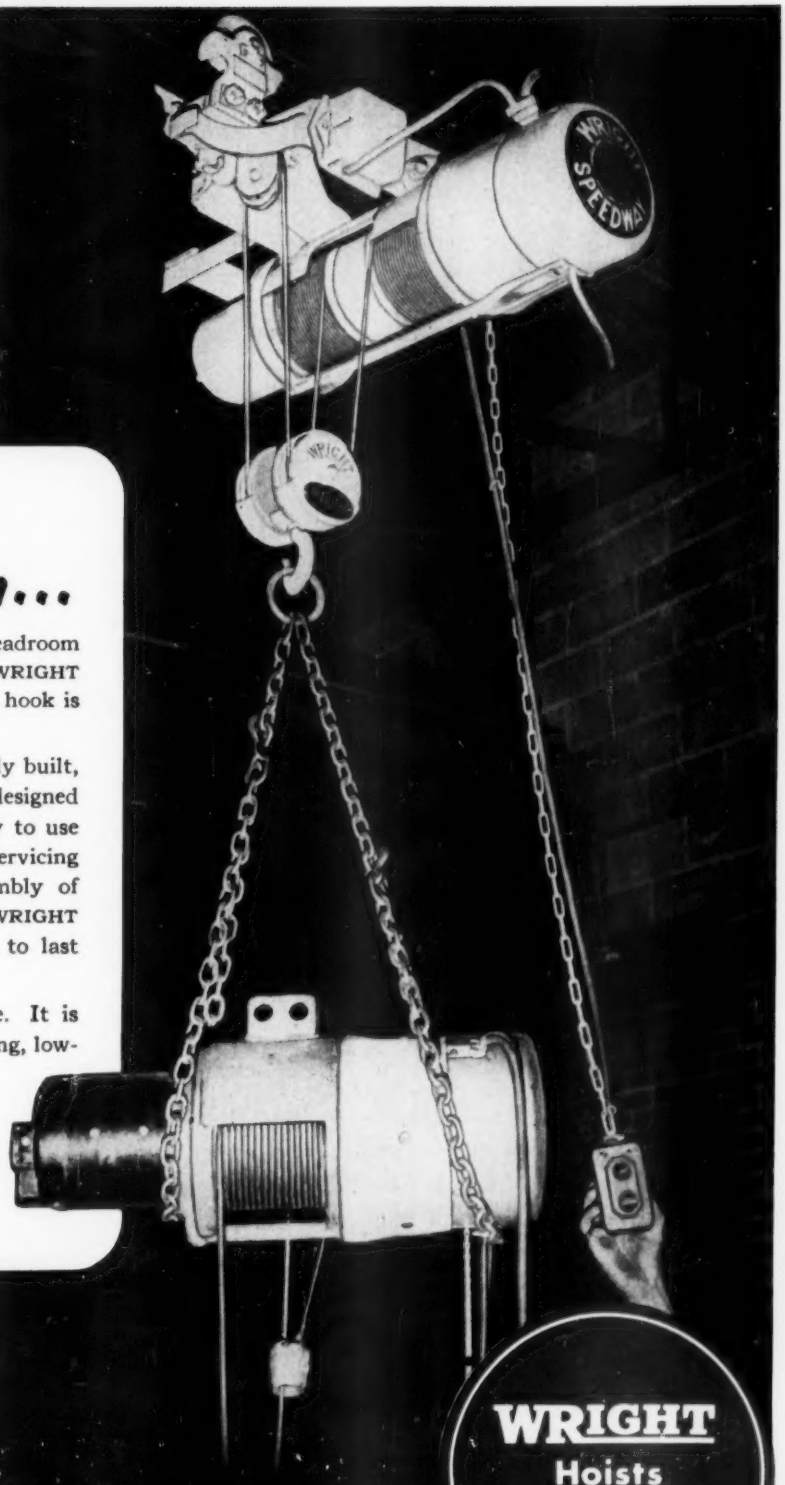
Metal contained in the dross is flattened as it passes through the rollers; the remaining dross, being friable, is crushed to dust.

The material is then delivered by



Long chutes at left deliver different grades of material. Crushing machine equipped with hopper appears at right

an **ACCO** product



When You Need More Headroom...

● You'll find remarkably close headroom in the new trolley-mounted WRIGHT *Speedway* Hoist. From beam to hook is only 12¼" on the Frame 1.

This hoist is compact, ruggedly built, and perfectly balanced. It is designed with features that make it easy to use and give it unusually long life. Servicing is simplified by quick disassembly of parts or sections of the new WRIGHT *Speedway*. Wire rope is rigged to last longer and is easily replaced.

Here is a hoist you will like. It is priced right and will give you long, low-cost service. See your WRIGHT distributor right away or write us for literature on WRIGHT *Speedways* with capacities from ¼ to 10 tons.

WRIGHT
Hoists
Trolleys
Cranes

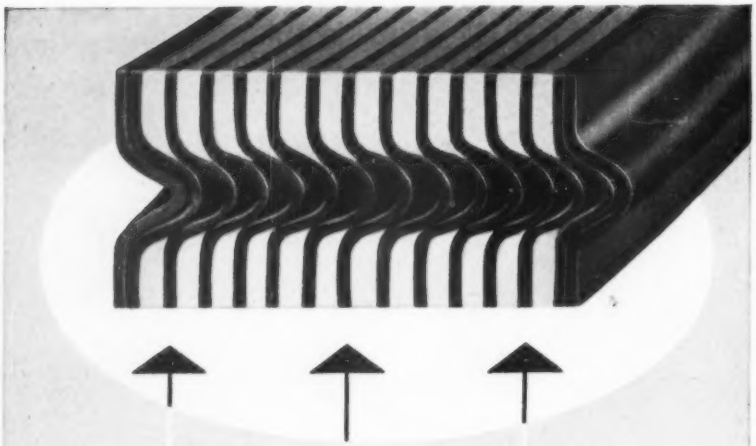
ACCO

TRADE MARK

WRIGHT HOIST DIVISION
AMERICAN CHAIN & CABLE

York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts circle 535 on Reply Card



Every Gasket an EXPANSION JOINT

Ajax Spiral Wound Gaskets are literally just that. The live-spring action of the U-shaped metal plies—like the convolutions of tiny expansion joints—give and take with varying pipe line or boiler stresses to seal joints tight at safe bolt loads, and keep them tight under all operating conditions.

There are types and sizes for all standard flanges and for manholes, handholes and tube caps of all makes of stationary and marine boilers, waterwalls, economizers and other boiler accessories.

Materials of construction include plated low carbon steel or stainless, Canadian or Blue African asbestos or chemically inert Teflon. Sold universally through industrial distributors. Ask your supply house or write—

UNITED STATES GASKET COMPANY

FABRICATORS OF "TEFLON" & "KEL-F" FOR THE CHEMICAL PROCESS & ELECTRONIC INDUSTRIES

CAMDEN 1 NEW JERSEY

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

bucket elevator to the rotary tumbling screen where the metal and dross are separated. This screen grades the material into three categories: metal, oxide in the form of dust, and intermediate grade.

The metal is recovered and the dust, which may still contain extremely fine particles of metal, is sold to refiners for further treatment.

The intermediate material is passed through the recovery plant a second time, with the rollers set closer together. During this treatment, most of the smaller particles still remaining are recovered and the dust which is left is sent to the refiners. *From Target, published by British Information Services, New York, N. Y.*

Mechanical Foundry Ladles

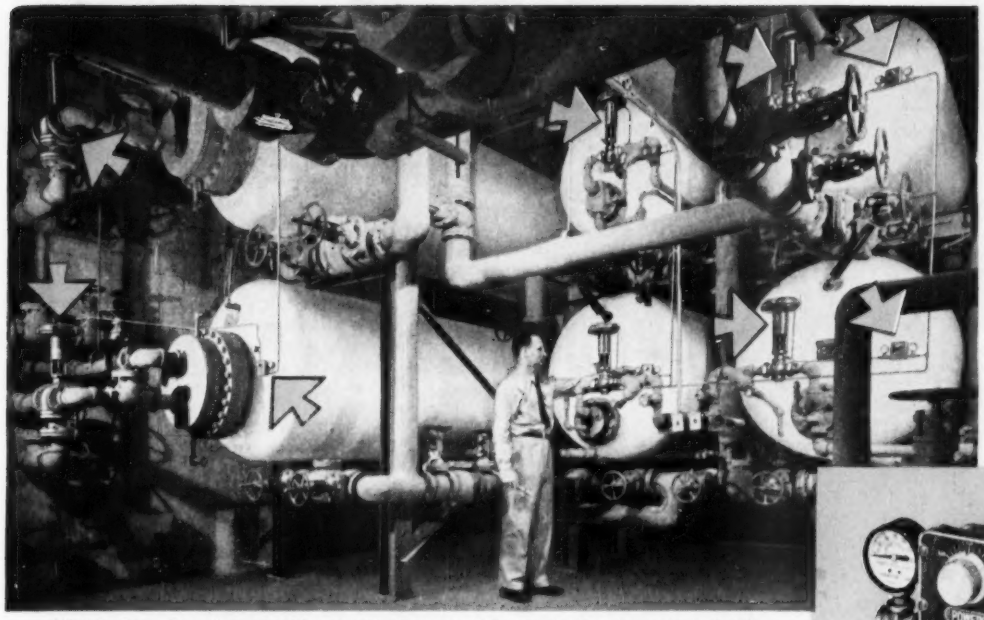
MECHANICAL ladles are replacing the manual type in the foundry of the Maytag Co. of Newton, Iowa. Each of the new ladles holds 200 lb of molten metal as compared to the 75 lb capacity of the old type.

Hoist supports ladle as it is being tilted with hand lever to fill the mold

These ladles are supported by an electric hoist which travels on an overhead monorail. The electric cord leading to the switchbox which controls the hoist is anchored to the ladle supporting structure. This keeps the switch within easy reach of the operator and prevents it from swinging through wide arcs.

Midway along the ladle handle is a lever by which the operator tips the pot for pouring. The end of the handle is fitted with a counterweight to help balance the ladle.

The mechanical ladles not only are more efficient but practically



Chief Engineer Edward MacDonald states "Performance of Powers Accritem Temperature Regulators has been highly satisfactory on the 6 water heaters shown above as well as on booster heater for dishwasher and for controlling cooling of condensate before discharge to sewer."

WATER HEATERS AT LEVER HOUSE
New York City

Architects: Skidmore, Owings & Merrill

Consulting Engineers: Jaros, Baum & Bolles

Contractor: Gillman-Rous-Pesce Corp.

LUX TOILET SOAP

One of **Lever Brothers Co.** Famous Soaps

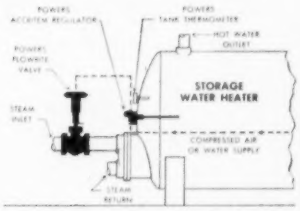
Powers ACCRITEM Regulator
Compressed Air or Water Operated

POWERS WATER TEMPERATURE CONTROL

ACCRITEM Regulators were selected for LEVER BROTHERS beautiful modern building on Park Avenue in New York City. The air conditioning system here is also Powers controlled.

Water heaters in more and more prominent buildings are being equipped with Powers Accritem Regulators because of their —

Unsurpassed for reliability and power to operate large or small diaphragm valves controlling Water Heaters, Heat Exchangers, Jacket Water Cooling for Diesel Engines or Air Compressors and many Industrial Processes.



POWERS 3-Way FLOWRITE Water Mixing VALVE Used on two heaters above

Important Features that Give Better Control and Lower Maintenance

- ***Adjustable Sensitivity*** and over-heat protection.
- ***Calibrated Dial*** temperature adjustment.
- ***Simple, Rugged Construction*** withstands vibration and insures years of reliable service.
- ***Temperature Ranges*** 50-250° F. and 150-350° F.
- ***Easy to Install.*** Requires 15 lb. supply of compressed air or water for its operation.
- ***Small Size***—regulator head is only 2⅞" x 3⅝", sensitive bulb is 12" long with ½" I. P. S. connection.

Bulletin 316 gives full details

Call Powers for aid with your problems of temperature control. Our more than 60 years of experience may be helpful to you. Whether you want a simple self-operated regulator or thermostatic water mixing valve or a pneumatic control system with recording controllers. . . contact Powers.

POWERS Single Seat FLOWRITE VALVE Used on 4 heaters above

THE POWERS REGULATOR COMPANY

3400 OAKTON STREET

Skokie, Ill. • Offices in Over 50 Cities, See your phone book • Established 1891

(a91)

For more facts circle 537 on Reply Card

How much does materials handling add to your production costs? Along assembly lines? Around machine tools? On loading platforms? In and out of storage? Handling materials is the largest single cost item in most plants. Start licking it now!

Thousands of plants have found the answer to efficient movement of materials with this quick, effortless, low cost way — "thru-the-air" with P&H Hevi-Lift Hoists.

You merely press buttons to whisk loads from one station to another — no strain on skilled hands, no floor congestion, no costly delays. With P&H's full magnetic push-button control, you can also have variable speed where needed.

P&H Hoist Engineers have helped solve hundreds of problems like yours. They can show you how to save money — in the places where most money *can* be saved.

CALL YOUR P&H HOIST DEALER

Or write us for Bulletin H-20.

P&H HOIST DIVISION

HARNISCHFEGER

CORPORATION

MILWAUKEE 46, WISCONSIN

the P&H *Line*

TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PRE-FABRICATED HOMES · ELECTRIC HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

eliminate back strain and greatly reduce the chances of an accident. *From Maytag Bulletin, published by The Maytag Co., Newton, Iowa.*

Inside an Acetylene Cylinder

Do you know that there is no free gas in an acetylene cylinder? It contains gas dissolved in a liquid. This is absorbed by a solid, highly porous filler material.

The porous filler soaks up acetone, a liquid chemical in which acetylene will dissolve while under pressure. When the cylinder valve is opened, the pressure is relieved and acetylene flows from the acetone.

Cylinders containing acetylene should always be stored and used in an upright position. If a cylinder is used while on its side, the liquid acetone may be carried into the regulators and prevent it from working properly.

If acetone reaches the blowpipe tip it will greatly reduce the flame's temperature. This can make it difficult to get a sound weld.

Knowing these facts and other useful information about your acetylene cylinders can make your shop a safer, more efficient place to work. *From Linde Tips, published by Linde Air Products Co., New York, N. Y.*

High Voltage Circuits Get Gamma Ray Check

WORKING to a deadline to provide high voltage underground circuits for the Ontario Hydro Electric Power Commission, Canada Wire and Cable Company, Toronto, saved valuable machining time and assured no failure from casting—with gamma ray inspection last month.

The underground circuit takes 20,000 and 161,000 volt power from the hydro steam plant at Toronto. Three-conductor cables are encased in a steel pipe which is nitrogen filled at rated pressure of 300 psi and normally operates at 200 psi. Large metal castings transfer the three-conductor cable from the pipe to three single aluminum-sheathed conductor cables. Thus the castings must seal and withstand the pipe pressure and secure the cables.

To assure prompt supply of four castings necessary, seven castings were made, ranging from 90 to 100 lb each. If any of the four delivered developed shrinkage or porosity troubles after installation it could occasion 100 hr work and 3 to 4 weeks delay to completion of the job. Canada Wire and Cable engineers prevented this by having the castings radiographed.

The rough castings were trucked to Isotope Products plant at Oakville in the morning; returned with reports the same night. Of seven castings, the gamma ray radiography showed up porosity in three of them. Canada Wire and Cable Company, estimated that to have machined these three castings would have wasted 60 labor hrs and machining costs. New castings were made and again tested. Additional to the gamma ray inspection, the castings were further checked with 400 lb air pressure before installation.
cost.

Isotope iridium 192 was used by Isotope Products on the Canada Wire and Cable castings.

Isotope sources are being used for other such inspections in the electrical supply industry. Fuse covers, small and large insulators, ring-type stove elements are among the electrical products which Isotope Products have examined by gamma ray radiography for Canadian firms. *From Canadian Isotope Newsletter, published by Isotope Products Ltd., Oakville, Ontario.*

Plant Fire Brigade

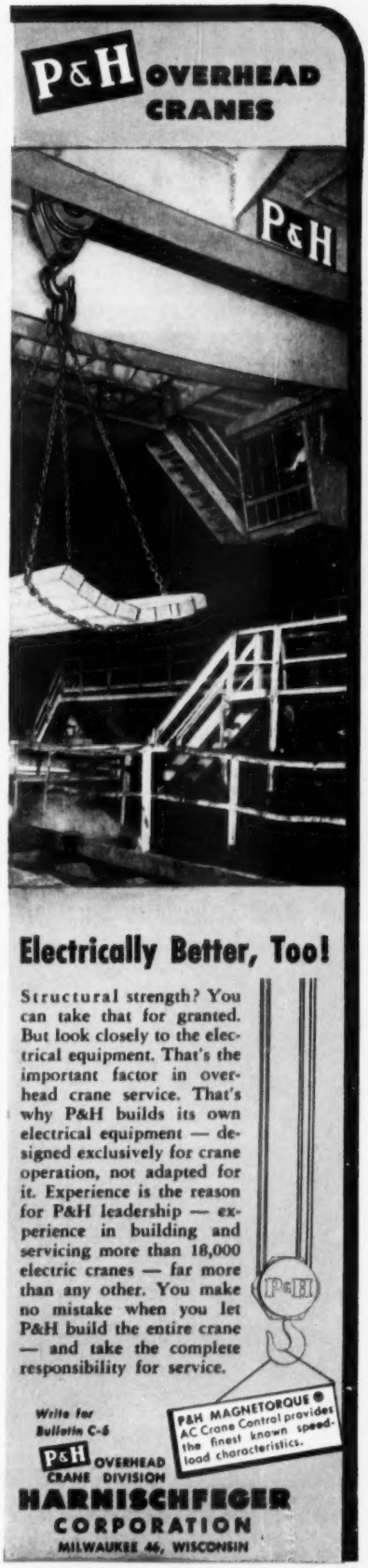
THE FIRE BRIGADE organization at Eaton Manufacturing Company's Axle Division was recently revamped to provide faster and more efficient protection.

An Advisory Board in charge of the new program handles all reports of fire hazards, suggestions for better fire protection, organization of fire training, the fire safety information program for all employees, and oversees maintenance of extinguishing equipment.

The first act by the Board was to enlarge and decentralize the existing fire brigade. It was broken down into squads, each with a captain and assistant chiefs. Each squad was assigned to guard the specific section of the plant in which its members work. This means that during all shifts, trained fire-fighting groups are immediately available in all sections of the plant in which its members work. This means that during all shifts, trained fire-fighting groups are immediately available in all sections of the plant. In emergencies, any squad may be called on to move to another part of the plant.

Once each month all captains and assistant chiefs meet with the Advisory Board to discuss developments in fire safety and equipment as well as new problems which have arisen in the plant since the previous meeting.

Each time a fire occurs in the plant, no matter how small, a meeting of the Advisory Board is called which is attended by the captain and members of the squad responsible for the plant area in which the fire flashed. The cause of the fire is discussed and steps worked out to prevent the re-occurrence of such a fire. *From a news release of Walter Kidde & Co., Belleville 9, N. Y.*


P&H OVERHEAD CRANES
P&H
Electrically Better, Too!
Structural strength? You can take that for granted. But look closely to the electrical equipment. That's the important factor in overhead crane service. That's why P&H builds its own electrical equipment — designed exclusively for crane operation, not adapted for it. Experience is the reason for P&H leadership — experience in building and servicing more than 18,000 electric cranes — far more than any other. You make no mistake when you let P&H build the entire crane — and take the complete responsibility for service.
P&H MAGNETORQUE AC Crane Control provides the finest known speed-load characteristics.
Write for Bulletin C-6
P&H OVERHEAD CRANE DIVISION
HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN
For more facts circle 539 on Reply Card

Edited by H. E. B. Anderson

Grinder Clamp from Vise-Grip Pliers

Contributed by Dennis Quinn
Allis-Chalmers Manufacturing Co.

A UNIQUE ADAPTATION of the familiar vise-grip pliers provides a quick, easy method of attaching and

Wheel dresser guide clamped in position on grinder rest by vise-grip pliers

removing a wheel dresser guide on a shop grinding wheel. Instead of securing the guide to the grinder rest with bolts, thus involving considerable time and effort, the guide is fastened to the pliers. Then the pliers, with the guide attached, can be quickly clamped on the rest, each time the wheel is to be dressed.

Two U-shaped extensions are welded to the plier jaws. The dresser guide is bolted to the upper extension, with a leather strip fastened under the guide. This strip provides resiliency when the pliers are locked in place on the rest.

The extension on the lower jaw of the pliers is shaped to fit around the rest support post when the guide is clamped to the rest.

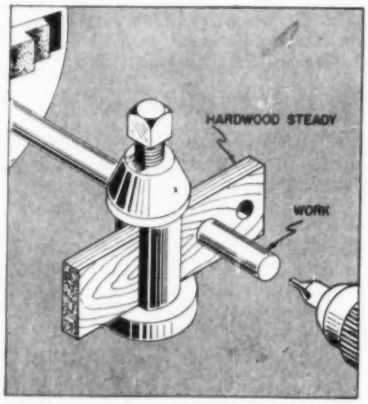
Concentric Centering Guide

Contributed by F. E. Riley

A SIMPLE AND SPEEDY steady rest for supporting round stock ends for center drilling in a lathe can be made from a length of close-grained and well-seasoned hardwood.

The hardwood is drilled with holes which are fairly close running fits for various bar diameters. It is a simple matter to chuck a short piece of the bar and run the overhanging end in one of the holes in the hardwood steady, to center it for that particular diameter rod. Since the rod is running on its own outside surface, the center drilled in the end with a drill in the tailstock chuck will be concentric with the outside of the rod.

The wooden steady rest is mounted in the lathe tool post, with the tool



Wooden steady rest mounted in lathe tool post. Rod is in position to drill

height adjuster removed. The bottom surface of the steady thus rests on the tool post ring and is always at the same center height when mounted in the tool post. The horizontal position of the work can be easily aligned with the drill in the tailstock by moving the cross slide.

Hand Truck Designed to Carry Tote Boxes in Plant

Photo: Faultless Caster Corp.

Wheeled hand truck (Go Devil) designed to roll under stack of tote boxes to lift and transport them in groups. Foot pedal trip release lowers front of truck to raise boxes. Plant engineering force has motorized one unit for ramp travel

Salvage Building Cuts Waste

A SALVAGE storage building is the foundation of a systematic and money saving plan to salvage discarded machinery at the Minnesota and Ontario Paper Co., International Falls, Minn.

For the first time, M and O's salvage operations will be under one roof, with a specific crew assigned to salvage and recondition production equipment, discarding worn-out equipment for scrap and sending repaired and reconditioned parts back to the stores department for re-use.

Before erection of the 80 ft by 60 ft by 20 ft all-steel building, salvage operations at the mill were haphazard. Usually when a discarded piece of equipment was needed, a mechanic made a search of the salvage yard, often in several feet of snow.

Much of the work in connection with salvage and scrap was done in open areas in the mill yard, where rust played havoc with reclaiming and replacement costs. Storage of reclaimed materials in the mill buildings resulted in housekeeping and safety problems—the results of crowded aisles and building bays.

Built and designed by the engineering department, the building is of galvanized metal siding, with a reinforced concrete floor.

As a result of the new salvage

SEALTITE

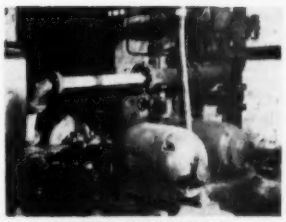
First flexible conduit to gain UL approval for wet spots

Industry after industry has adopted flexible *and* liquid-tight SEALTITE* electrical conduit. They have used it successfully to protect wiring from moisture—outdoors or indoors. They have used it where movement, vibration, misalignment, cramped quarters, or installation time are problems. In addition, they have made impressive savings in maintenance.

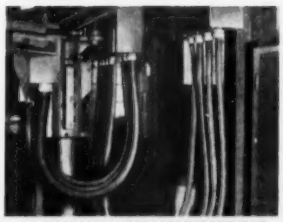
Now new SEALTITE Type UA is the *first* flexible, liquid-tight conduit to be *approved by Underwriters' Laboratories, Inc.* It has met their rigid tests for a conduit that, while retaining remarkable flexibility, guards wiring against corrosive moisture and mineral oils (up to 60 C). SEALTITE Type UA conforms with provisions of Article 351 of the National Electrical Code under "Liquid-Tight Flexible Metal Conduit." 52241

*Trademark

specify SEALTITE Type UA for

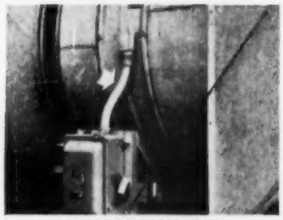


WET LOCATIONS



MOVING CONNECTIONS

OUTDOOR PROTECTION



MISALIGNMENT

Write for Bulletin UA-530 on UL-approved SEALTITE. Leading electrical supply houses stock SEALTITE Type UA in long random lengths. You can cut it as needed without waste. Underwriters' Approved Connectors for use with SEALTITE are also available at your electrical supply house. The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut. In Canada: The Canadian Fairbanks-Morse Company, Ltd.

A JIC-approved SEALTITE Type EF is also available. Write for Booklet EF-531.

for flexible, liquid-tight electrical conduit—specify SEALTITE an ANACONDA® product

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OPERATION & PRODUCTION

(O and P begins on page 48)

plan, many pieces of equipment, formerly scrapped, will be put back into useful production with a substantial dollar saving.

In addition, locating the building along a rail siding has centralized the collection and loading of scrap for shipment, with resultant savings in handling costs.

Plant engineers expect to salvage larger quantities of valves, pipe fittings, reducers, sheaves and pulleys, elevator buckets, unit heaters and coils, belts, and other items. Future plans call for an addition to the present building to be used to salvage structural shapes and piping.

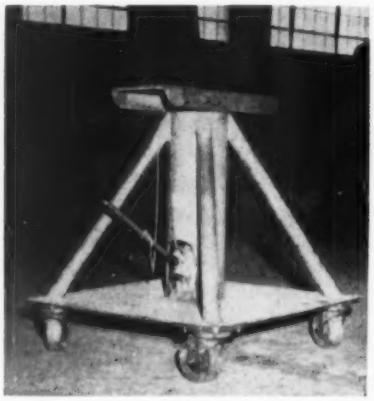
Hydraulic Unit Lifts Trailers

Contributed by R. T. Angel

HANDLING of partially completed industrial trailers has been greatly facilitated by use of simple castered dolly on the main assembly area at the Spokane, Washington, plant of Brown Aluminum Trailers, Inc.

The dollies are used primarily to lift the front end of trailers so they can be piloted into prepared positions for assembly operations.

Essentially the structure consists of a flat, square plate on which is mounted a telescoping arrangement for lifting. The outer pipe of the telescope is braced from the four corners of the base plate with pipe of smaller diameter. The inner pipe of the telescope slides in steel collars welded inside the outer pipe at top and center locations. This inner pipe is plugged at the bottom end and the support channel or lifting member is welded at the top. The opening at the base of the outer pipe permits entrance of a portable hydraulic jack to supply the lift. The length of the inner pipe is determined by the stroke of the available



Casters provide mobility for hydraulic jack. Chain secures jack handle to unit

jack; in our case, a 12-ton, manually operated jack with 6-in. stroke. A tension spring attached to the jack handle receptacle "cocks" the jack for each stroke.

Heavy duty ball bearing swivel casters are mounted under each of the four corners of the base plate to provide movement in all directions.

Thermostats Measure Liquid Level

AN INGENIOUS APPLICATION of thermostats solved the problem of keeping a continuous check on the operation of a liquid level controller in a hot asphalt tank. Also, a positive visual alarm is provided in case the controller fails to function. The thermostats were adopted because the high temperature and extreme viscosity of the asphalt interferes with the operation of most level indicating instruments. This system of level indication was devised by engineers at the Flintkote Co., East Rutherford, N. J., for use in a 15-ft deep dip tank in which insulated siding is saturated with liquid asphalt at a temperature of about 420F.

Two rows of Thermoswitch units, each containing 11 units spaced 6 in. apart, are mounted on opposite walls of the tank. The rows are staggered vertically so that liquid level is actually measured at 3-in. intervals. A set of 3 pilot lights can be connected through prong-type connectors, to any 3 thermostats, depending on which liquid level is required for a particular operation.

The Thermoswitch units set at 375F, follow the position of the liquid level by responding to the temperature of the asphalt. Thus, when a thermostat is submerged in the asphalt, its contacts are open; when the liquid level falls, the contacts close. In the set of 3 pilot lights, a red light indicates the lowest allowable level; a yellow light, the safe operating level; and a green light, the highest allowable level. During normal operation of the dip tank, the yellow light will occasionally blink on and off, indicating the slight rise and fall of the level as the asphalt is used and automatically replenished. The green light usually burns steadily.

A safety feature of the Flintkote installation is the use of an auto-

Woodworking Shop On Wheels Takes Tools to the Job for On-the-Spot Repairs

A MOBILE WOODWORKING SHOP for use outside the main shop building is in operation at the Long Beach, Calif., Naval Shipyard installation.

The shop consists of two units, each 5 ft by 14 ft, mounted on rubber tired wheels, and can be towed to any place in the yard.

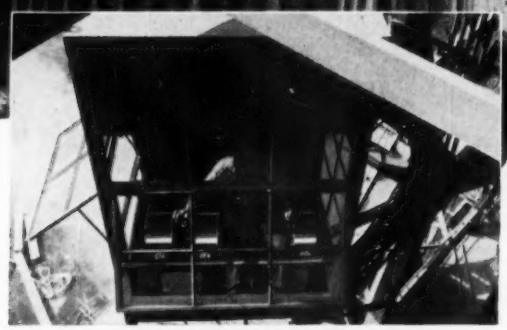
Machine and bench units of the mobile woodworking shop are coupled for towing

The machine unit carries a bandsaw, jointer, table saw, drill press, overhead cutoff saw, and a vertical belt sanding machine. All the machines are connected to a central control box, so that a single 440 v plug feeds power to the whole unit. Each machine, however, has its own control switch.

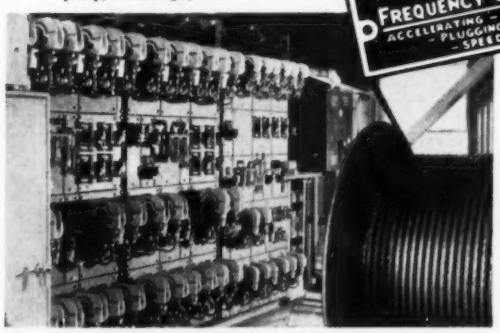
The second unit is a mobile woodworking bench with woodworker's vises mounted on two diagonal corners, and a 5-in. machinist's vise mounted on one end. The bench has drawers on both sides for tools, screws, nails, and hardware. One drawer is full bench width, to carry woodworker's door and C-clamps.

With the self-contained units available, repair work can be done at the most convenient location in the yard, saving the manhours required to transport woodworking jobs to a central shop.

Fast Lifts – Safe Lifts WITH EC&M CONTROL easy to operate, TOO



Narrow-width EC&M Cam Master Switches are closely grouped for operator's convenience on this 720 ton-per-hour Barge Unloader, designed, fabricated and erected by Heyl & Patterson for the Duquesne Slag Company, Pittsburgh, Pa.



EC&M LINE-ARC Contactor Controllers for Closing & Holding Line Motors and for the Trolley Motion are EC&M Frequency Relay Controlled for fast, safe operation.

Output increases and costs go down when operators find rhythmic response at their finger-tips. Paying out cable to dig into the pile, taking the swing out of a loaded bucket at the point of discharge, and keeping the bucket open when lowering for another load are time-savers on bulk material-handling applications.

On river unloading stations, at lake and ocean ports, EC&M Control has a reputation among operating management for fast handling because bucket manipulation, trolley travel and similar operations respond quickly to the operator's needs. Straight-line, lever-operated EC&M Cam Master Switches have a short throw in both directions—are less tiring on the operator—the off-point is distinct and easy to find when returning from any of the speed-points. Put your control applications up to EC&M.

It pays to specify **EC&M Control—**
control engineered for high output with safety.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

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READING CRANES ARE CUSTOM-BUILT

To Assure You
Faster, Lower Cost
Materials Handling Operations

When you have a READING CRANE installed in your plant, you get a crane CUSTOM-BUILT to meet your specific materials handling operation—at no added engineering cost!

Known as UNIT DESIGN, this unique method of crane construction reduces your costs in two ways:

1. LOWERS FIRST COST—Because READING CRANES offer you a choice of several interchangeable motor, control, and hoisting units, you buy no "extras" to solve special handling problems.
2. REDUCES MAINTENANCE COSTS—All of the operating parts in a READING CRANE are easily accessible for overhaul or repair. The UNIT DESIGN feature makes it possible to remove any one unit without expensive "breaking down" of other units.

See your distributor for information on how you can get a READING CRANE "tailor made" to your own specifications. Drop us a line for your free copy of "The Why and How of Faster Production".

READING CRANE & HOIST CORPORATION 2103 Adams St., Reading, Pa.

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CHAIN HOISTS | OVERHEAD TRAVELING CRANES | ELECTRIC HOISTS

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OPERATION & PRODUCTION

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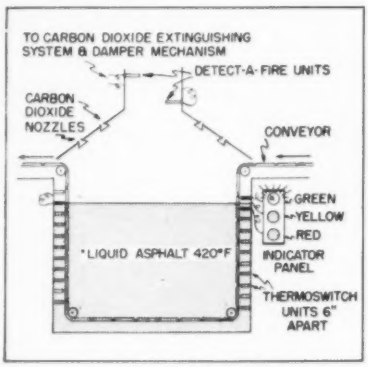
matic carbon dioxide extinguishing system. The top of the tank is enclosed by an exhaust hood, mounting a pair of Detect-A-Fire units.



Drawing: Fenwal Incorporated

Drawing of liquid level measuring system. Units bracket desired liquid level

These fire detectors control the release of carbon dioxide and dampen the draft in the hood exhaust duct, in the event of fire in the tank.

Drop Hammer Cushion Of Paper-Wood Laminate

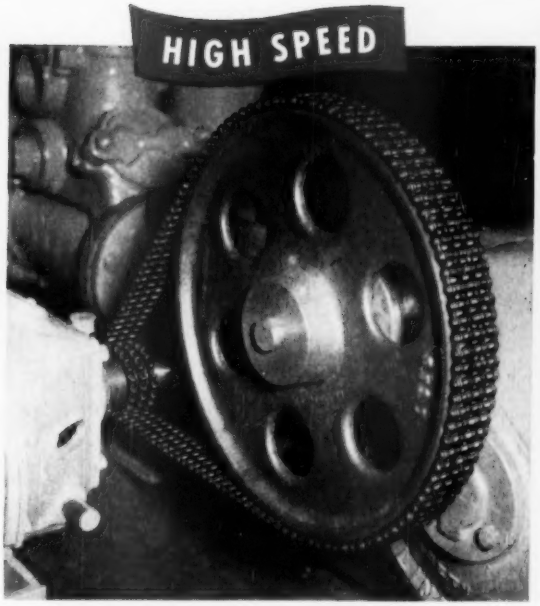
PRODUCTION ECONOMIES and benefits have resulted from the introduction of a hardwood and kraft paper laminate into drop forge hammer operations at Castle Industries, Inc., Everett, Washington.

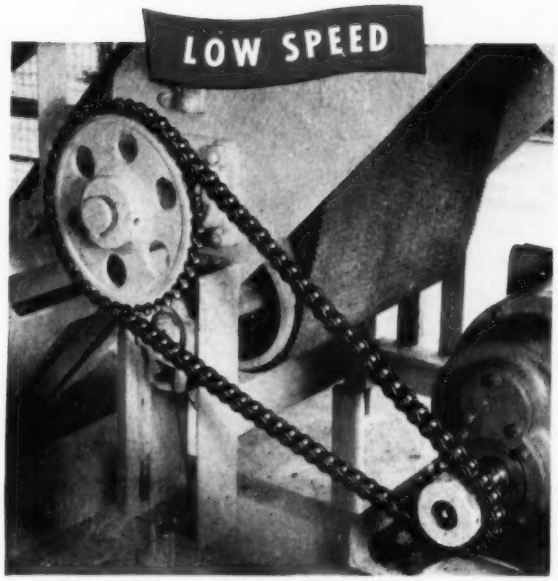
In the operations, it was found that placing 8 sheets of the ⅛-in. thick laminate, called Tekwood, around the base die improved the metal forming. Previous use of rubber and ordinary plywood for the

Photo: United States Plywood Corp.

Eight U-shaped pieces of hardwood-kraft paper laminate ease hammer drop

the same *HIGH* Efficiency at *ALL* speeds *with* *Roller Chain Drives*





- ***98-99% Efficiency Maintained.***
- ***No Slip or Creep*—Diamond Roller Chains are as positive as gears.**
- ***Load Shared by many Sprocket Teeth.***
- ***Stress on Bearings Reduced*—and no separating forces as with gears.**

Shot-Peening Since 1944

Diamond Chain has long recognized that certain types of internal stressing of chain parts would increase fatigue resistance. To this end, link plates have been specially processed and chain rollers and other parts have been shot-peened since 1944.

Equal Load Distribution Across Multiple-Strand Chains

Diamond's development of press fit center plate for multiple-strand chains made possible greater successful use of heavy stressed drives.

• Experienced machinery design engineers and production men realize the importance of high maintained efficiency of power transfer with the result that Diamond Roller Chains are in greater use today than ever before. Precision manufacture of every part, — side plates, rollers and bushings assure uniform high quality, long-life smooth performance. Catalog 709 gives useful data and information; copy mailed on request.

DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Tradition

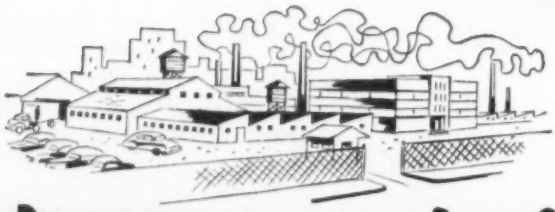
Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Indiana

Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

For more facts circle 543 on Reply Card



INDUSTRIAL NOISE

can cost you money these 3 ways...

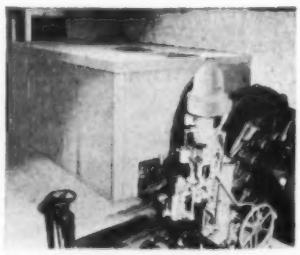
✓ **FIRST** . . . losses caused by worker fatigue, slowed reflexes, and nervous tension. These may show up in needless accidents, excessive spoilage, or communication errors.

✓ **SECOND** . . . losses due to industrial deafness claims. A substantial increase in claims and awards cannot help but increase your insurance costs.

✓ **THIRD** . . . losses caused by defending damage suits brought by your neighbors. Whether justified or not, these claims cost money to defend, and impair your public relations.

INDUSTRIAL SOUND CONTROL, Inc., can solve your problems by stopping noise at its source, through the use of sound traps, portable sound barriers, soundproofed rooms, and machinery enclosures, used singly or in combination. Let ISC, famous for "quieting anything that makes noise", protect you from these losses at surprisingly low cost.

Write today for free booklet "SOUND FACTS".



"Soundproofing a noisy pump or compressor with ISC 'Soundmetal' panels."

MIDWESTERN DISTRIBUTOR: Midwest Industrial Sound Control, Inc., 1455 North Pennsylvania Street, Indianapolis 2, Indiana.

SILENCE SERVICE

Industrial Sound Control Inc.

45 Granby Street, Hartford 12, Conn.

2119 SO. SEPULVEDA BLVD., LOS ANGELES, CALIF.

For more facts circle 544 on Reply Card

OPERATION & PRODUCTION

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application had proved unsuccessful, since the rubber was too soft, and the plywood left grain marks in the metal. With the laminated sheets (heavy kraft paper bonded to both sides of a hardwood core) in place, 95 per cent of the corner wrinkles previously experienced were eliminated, and production increased.

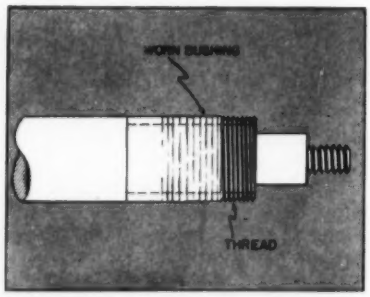
The Tekwood provides a firm buffer around the die, but is elastic enough to allow the correct stretching of the metal around the die.

Removing Tight Bushings

Contributed by William Steindl

A WORN PACKING SLEEVE or bushing on a pump shaft is often very difficult to remove from the shaft. On occasion, it is necessary to split the bushing to get it off.

A suggested method of removing a stuck bushing utilizes a wheel puller



Nut screwed on threads cut on end of a worn bushing provides grip for puller

to do the heavy work. To remove the bushing, thread its outboard end to receive a nut. This nut then becomes a gripping point for a wheel-puller, acting against the end of the shaft, to slide the bushing off the shaft with little difficulty.

Drum Cart Fitted with Rollers

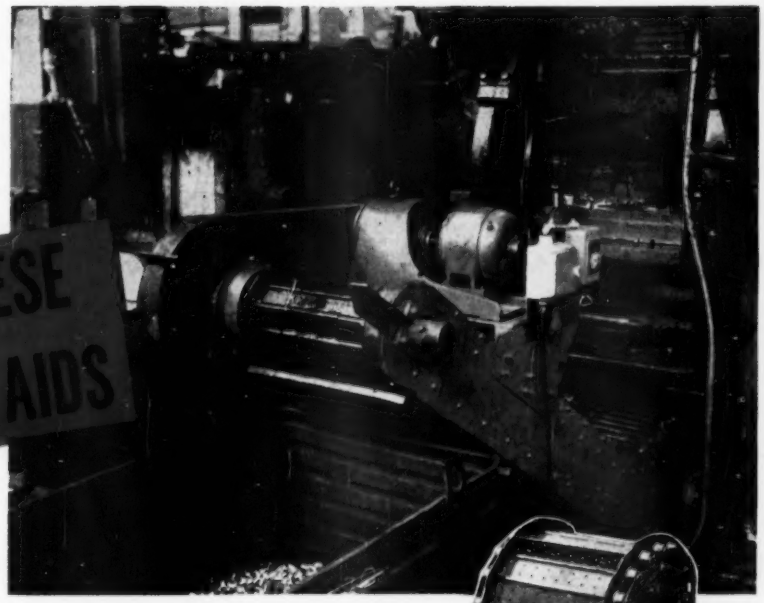
Contributed by T. H. Duffy

A HANDY DRUM CART can be easily and cheaply made of scrap pieces found around most plants.

An upright drum of oil, disinfectant or paint is tilted slightly so as to permit the nose of the cart to be run under it. The drum is then levered back on the cart's rockers until the wheels take the load for transportation.

In the storage position, the drum rests on the small rollers which permit revolving the drum to bring the pouring opening into proper position. In field work, no valve is necessary for pouring, since an ell spout can

Installation view (right) shows the Jeffrey Hinged-type Apron Conveyor operating beneath a punch press in a machine shop.



IN PLANNING FOR "WHAT'S AHEAD" . . .

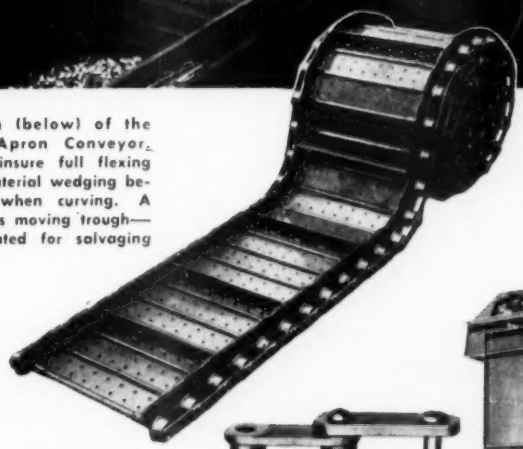
CONSIDER THESE PRODUCTION AIDS

CONVEYORS • AERATORS • SKIP HOISTS • WEIGH LARRIES • CRUSHERS • PULVERIZERS • MOLD CONVEYORS • FLASK FILLERS • MAGNETIC SEPARATORS • CAR PULLERS • FEEDERS • TRANSMISSION MACHINERY

Hinged-type Steel Apron Conveyors — especially suitable for handling small, light-gauge metal parts. With lifting blades will convey up steep inclines, making a compact unit for carrying small parts from quenching tanks, heat-treating operations or from beneath punch presses, upsetters and other automatic machine tools. See two photos top right.

Metal Turnings Crushers — for uniform reduction of long coils of alloy or high carbon steel and brass turnings into short or shoveling lengths — can be arranged for side or top feed by hand or conveyor. Note cross-section.

Also shown at extreme right are a continuous Bucket Elevator and two sections of Jeffrey Chain. All of these units designed to speed production and reduce costs. May we make other suggestions to help you in your planning for "What's Ahead"?



Coiled section (below) of the hinged-type Apron Conveyor. Rolled hinges insure full flexing and prevent material wedging between flights when curving. A tight, continuous moving trough—can be perforated for salvaging coolant.

Jeffrey Metal-turnings Crusher for uniform reduction of steel or brass turnings. Specially shaped crushing elements. If desired, a specially-designed feeder-conveyor can be supplied.

THE JEFFREY MANUFACTURING COMPANY

905 North Fourth St., Columbus 16, Ohio

MATERIAL HANDLING PROCESSING AND MINING EQUIPMENT

Baltimore 2 Boston 16 Cincinnati 2 Duluth 13 Houston 2 New York 7 St. Louis 1
Beckley, W. Va. Buffalo 2 Cleveland 15 Fairy Port, Pa. Jacksonville 2 Philadelphia 7 Salt Lake City 1
Birmingham 3 Chicago 1 Denver 2 Boston, Ky. Milwaukee 2 Pittsburgh 22

Jeffrey Mfg. Co. Ltd., Montreal, Canada — The Galion Iron Works & Mfg. Co., Galion and Bucyrus, Ohio
British Jeffrey-Diamond Ltd., Wakefield, England — Galion (Great British) Ltd., Wakefield, England
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S. A. — The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

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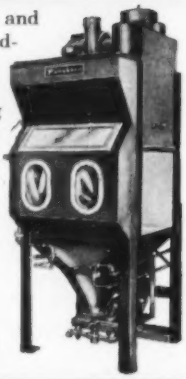
Here's BIG NEWS on Blast Cleaning Dust Control Precision Finishing

Blast Cleaning Unit is PORTABLE!

Ideal for maintenance and many other jobs, including removal of rust, dirt, scale, etc. Economically cleans large objects like tanks, bridges, structural work before painting. Six sizes, stationary or portable, from . . . . . $170.00 and up

Hydro-Finish SPEEDS POLISHING!

Removes scale, and directional grinding lines . . . prepares surfaces for plating and holds tolerances to .0001"! Liquid blast reduces costly hand cleaning and finishing of molds, dies, tools, etc. Models from $1410.00 and up



STOP DUST at the SOURCE!

Pangborn industrial type Unit Dust Collectors trap dust at source. Machine wear is minimized, housekeeping and maintenance costs reduced. Solves many grinding and polishing nuisances and material losses. Models from $286.00 and up

COMPACT Blast Cabinet for SMALL WORK!

Ideal for producing smooth, clean surfaces on pieces up to 60" x 36" in size. Cleans metal parts, removes rust, scale, grime, dirt, paint, etc., in a few seconds. Saves money all year 'round. Models from $319.00 up

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment

Pangborn MAIL COUPON FOR DETAILS

Check for more information

- ☐ Blast Cleaning Cabinets
- ☐ Blast Cleaning Machines
- ☐ Unit Dust Collectors
- ☐ Hydro-Finish Cabinets

PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md.

Gentlemen: Please send me more information on the equipment I've checked at the left.

Name.....

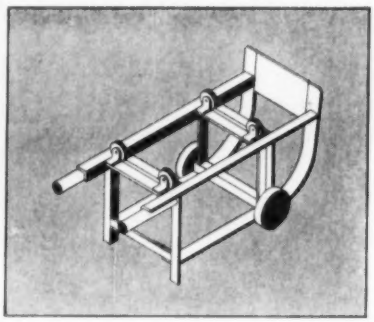
Company.....

Address.....

City.....Zone....State.....

For more facts circle 546 on Reply Card

(O and P begins on page 48)



Ease of construction and four turning rollers are the drum cart's features

be inserted into the pouring drum, and pouring can be stopped by revolving the drum to place the pouring spout at the top, where no liquid will run out of the spout.

Air Vibrator Packs Sand

Contributed by Roy Krouse
Allis-Chalmers Manufacturing Co.

IN SOME INSTANCES it is the shop practice, when bending lengths of pipe, to fill them with packed sand. This packed sand aids in retaining the original diameter of the pipe at the bend.

Formerly, the sand was poured into the pipe, and packed by rapping

Sand is poured into small-diameter pipe prior to bending. Vibrator clamped to base packs the sand in as it is poured

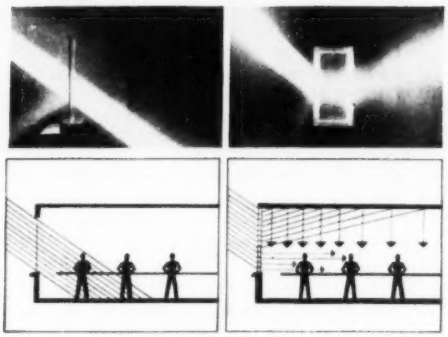
the pipe with a mallet as the sand filled the pipe.

Now, an air vibrator is clamped to the pipe, or in some cases, is clamped to a short length of large-diameter pipe. This length of pipe

INSULUX FENESTRATION SYSTEM

Above photos show plant of Goldenrod Ice Cream Co., Chicago, before and after Insulux Glass Block replaced expensive-to-maintain windows.

Before daylight engineering...NOW! Daylight Engineered



Direct sun causes uncomfortable brightness near windows, extreme contrast in other parts of room. Insulux Fenestration directs and spreads daylight to ceiling, keeps brightness at comfortable levels.

Daylight Engineering can help you plan an Insulux Fenestration System which will more effectively daylight your buildings.

The new Insulux light-directing glass blocks virtually "turn your building with the sun," catching light rays in the morning, at noon, and in the afternoon, directing them to the ceiling. Then they are reflected throughout the inside area.

Insulux Glass Block neither rust, rot nor corrode . . . They have high thermal insulation value . . . seal out dust, dirt and prowlers . . . improve your building's appearance . . . cut maintenance, heat and light costs.

Supplies of Insulux Glass Block and all of the installation materials needed are noncritical and immediately available in quantity.

Before replacing broken windows, rusted or rotted sash, consult a Daylight Engineer about the benefits of an Insulux Fenestration System. For a free consultation, write Insulux Glass Block Div., Kimble Glass Company, Dept. PE-1, Box 1035, Toledo 1, Ohio.

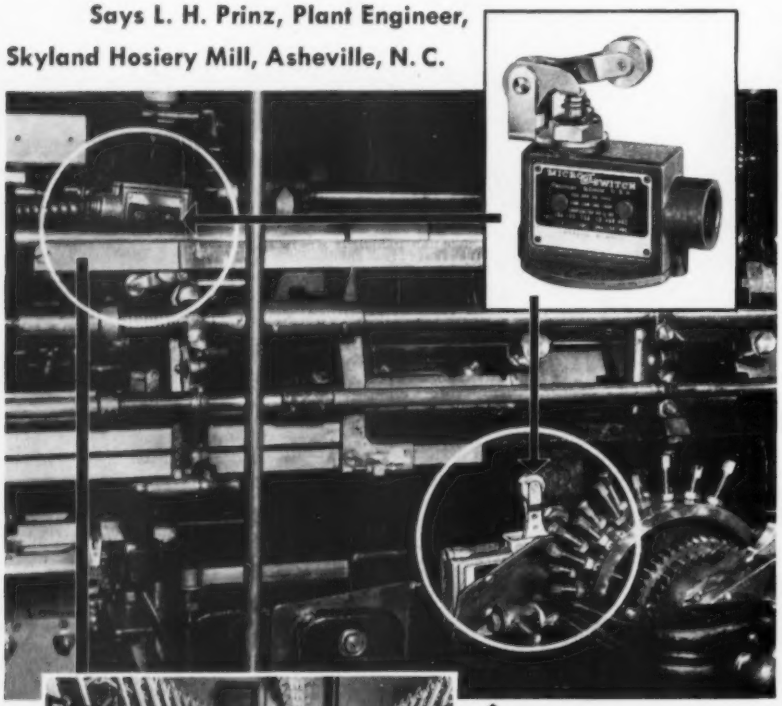
KIMBLE GLASS COMPANY

Toledo 1, Ohio

Subsidiary of Owens-Illinois Glass Company

"Since installing these two MICRO switches we have had no record of needle breakage"

Says L. H. Prinz, Plant Engineer, Skyland Hosiery Mill, Asheville, N. C.



Close-up view of the two MICRO switches installed on the carrier rack at the Skyland Hosiery Mill, Asheville, N. C. The switch at the upper left cuts off current in case of misadjustment of the carriage. The lower switch shuts off power if narrowing fingers endanger the needle bed.

View of portion of the Skyland Mill showing plant equipment that has been made safer and more automatic by the use of MICRO precision switches.

● Not only have these MICRO switches prevented needle breakage but, according to Mr. Prinz, they have also reduced the danger of jams on the carrier rack that can cost from $500 to $2000 to repair.

Skyland's engineer installed one switch on the carrier rack in such a way that it stops the machinery at once in the event of any misadjustment or mechanical failure on the part of the carriage. The other switch acts to stop the machinery if the narrowing fingers approach each other so closely as to tear up the needle bed.

Plant engineers in every industry are daily finding more and more uses for MICRO switches as limits, safeties and interlocks to make existing equipment more automatic and more productive.

There is a MICRO authorized distributor located near you with a wide variety of MICRO precision switches from which to select the switches best suited to your equipment needs. Micro engineering service is also available at nearby branch offices to help you solve your switch problems.

MICRO
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS

A DIVISION OF
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

For more facts circle 548 on Reply Card

OPERATION & PRODUCTION

(O and P begins on page 48)

acts as a base and receptacle for the sand and transmits the vibrations to the sand in the pipe being filled. With the resulting greater compaction, the sand provides better diameter control during bending.

Painting Stencil Fits Cone

PAINTING DIALS for compasses has become a simple operation at Temco Aircraft Corp., Greenville, Texas, with the development of a special stencil.

The dial of the compass is in the form of a truncated cone with the degree marks on the side. Due to its

Conical stencil holds dial against base as the whole is rotated for painting

shape, the dial does not lend itself to normal painting operations, yet markings on the instrument must be accurate.

The conical stencil now in use makes painting the dials with a spray gun practical. The hollow cone stencil fits over the face of the dial, which is mounted on a swivel base. The stencil and dial are then rotated with the knurled knob at the apex of the stencil while the paint is sprayed on with an ordinary spray gun.

Water Separator For Vapor Degreasing

IN VAPOR DEGREASING it is important, for maximum efficiency of the operation, that a water separator be used to keep the degreasing solvents, trichloroethylene and tetrachloroethylene (perchloroethylene), free of undissolved water.

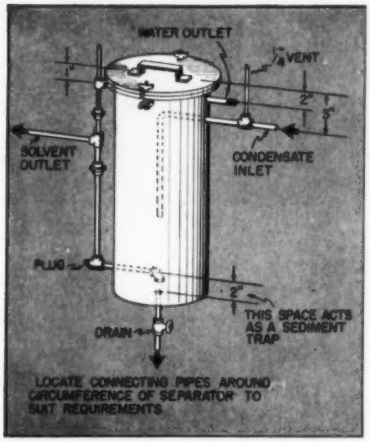
An article in *Bureau of Ships Journal* points out the supply shortage of these degreasing solvents and listed mixing of the solvents with water as a cause of solvent waste.

Presence of water vapor in the degreaser can be detected by a misty white appearance and "ghost vapors" above the condenser level.

In addition to waste of the solvent, the presence of water in the degreaser has other deterrent effects on the cleaning operation. Some of these effects are: Deterioration of the cleaning equipment by corrosion, water spotting and staining of the work cleaned, and less efficient soil removal.

Water enters the degreaser in five ways: 1. Moisture from the atmosphere condenses on the cooling surfaces; 2. It is dragged in on the work being cleaned; 3. Solvent vapor mixes with moisture in a humid shop atmosphere; 4. Through leaks in the water or steam coils; 5. Water may remain trapped in hidden crevices or the walls of the degreaser may be left damp in normal operation.

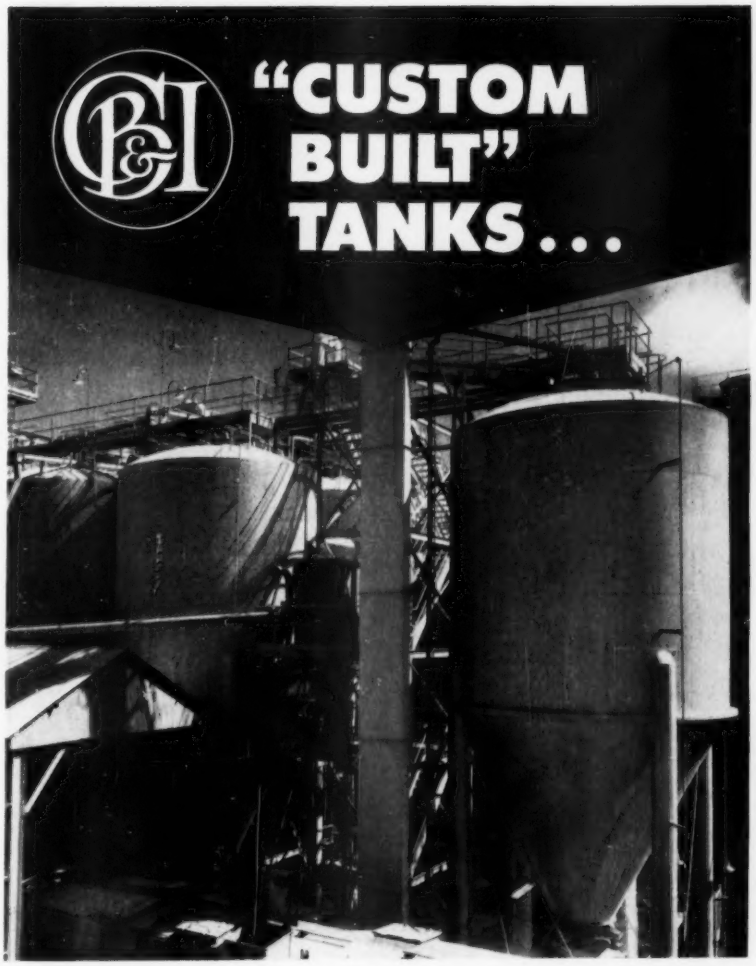
The water separator removes water from the degreaser by acting as a decanter. Although water vapor and solvent vapor mix freely, the liquids separate into two layers when they condense. The combined condensate collects in a trough and flows from the degreaser through a precooler to the water separator. The design of



Typical design for water separator. The dimensions vary with flow volumes

water separators is based on the principle of gravity. Condensed water floats on the surface of the heavier solvent condensate layer and flows continuously to a sewer from an upper outlet of the water separator.

An effective water separator can be made from standard pipe. Care should be taken that there are no uncondensed vapors entering the water separator and that water is not vapor-distilled back into the system from the separator. The precooler (a simple water jacket and lead-in pipe between the condensate and separator) will assure a sufficiently reduced temperature to enable condensation of all water from the various sources.



. . . for Special Jobs

"Custom Built" steel plate installations by Chicago Bridge & Iron Company are structures that are built to fit the job. They are playing a vital role as industry endeavors to increase production and obtain new operating efficiencies.

The 200-ton tanks shown above were fabricated at our Salt Lake City plant and erected at the Filtrol Corporation plant in Salt Lake City, Utah. The tank on the right stores one of the raw materials used in the manufacture of petroleum cracking catalysts. The other tanks at the left are used to store the finished product, both liquid and pellet.

Expert design, fabrication and erection of tanks and steel plate structures is available to all industry by our experienced engineering staff, plants and field crews. Whenever you plan a steel structure of any type, write our nearest office for quotations or information.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3	2148 Healy Building	Los Angeles 17	1574 General Petroleum Building
Birmingham 1	1555 North Fiftieth Street	New York 6	3317—165 Broadway Building
Boston 10	1067—201 Devonshire Street	Philadelphia 3	1649—1700 Walnut Street Building
Chicago 4	2134 McCormick Building	San Francisco 4	1582—200 Bush Street
Cleveland 15	2258 Midland Building	Seattle 1	1370 Henry Building
Detroit 26	1569 Lafayette Building	Tulsa 3	1669 Hunt Building
Houston 2	2166 C & I Life Building	Washington 6, D. C.	1130 Cafritz Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

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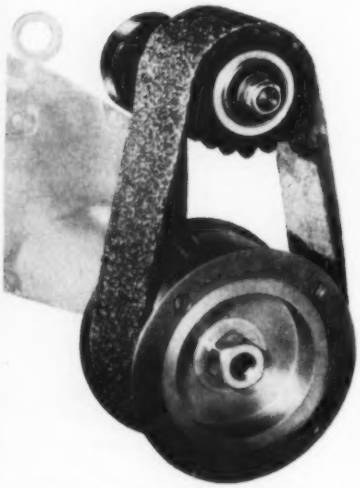
2 pages of HELPFUL COST CUTTING IDEAS for YOU

"GREEN-GRIT" silicon carbide wheels in vitrified bond put keen edges and fine finishes on carbide tipped tools—to close tolerances. Recommended gradings for offhand and surface grinding, wet or dry: rough, GC60-H11-VR; finish, GC100-G5-VR.



NEW "PORT-A-BELT" Grinding Attachment quickly converts any horizontal portable grinder to a belt grinder. It's light—compact—easy to attach. It's a natural for any metalworking shop concerned with die and mold grinding, weld cleanups, edge breaking, contour finishing. Often eliminates 2 or 3 operations.

NEW RESILIENT FEED WHEELS prove ideal in centerless grinding of armatures and other work requiring light but even pressures. Wheels are standard A 80-R2-R grading, with specially designed resilient rubber center. They'll save money for every centerless user.

NEW R3 (Rubber) BOND RACEWAY WHEEL lowers costs in the bearings industry. It cuts cool, holds form—reduces regrinds and rejects. One wheel often replaces tandem mountings. You'll get far more output per wheel, too.

...from CARBO

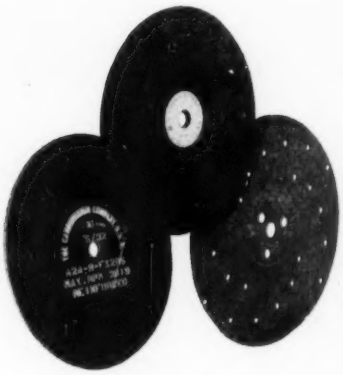
TRADE

"Carborundum", "Aloxite", "Green-Grit", "Red-I-Cut", "Fastcut", "Port-A-Belt", and "MX" are trademarks of The Carborundum Company, Niagara Falls, New York

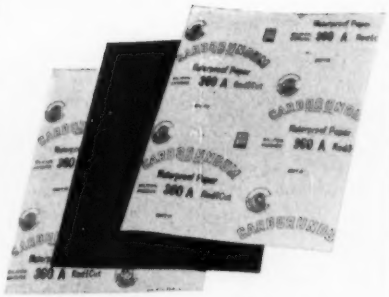
"85"

"87"

"FASTCUT" Pad 85 Assembly now permits *wet* sanding with discs, a brand new finishing method that gives better finishes in far less time. Complements the "FASTCUT" Pad 87 Assembly for dry disc sanding—another cost-cutter for you!



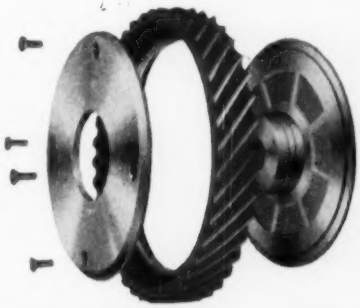
Abrasive **CUTTING OFF WHEELS**—from 12 to 20 times faster than steel saws—produce smoother cuts at lower cost than other, conventional, methods. Rubber bond for wet cut-off, resinoid bond for dry, "MX" for free hand... CARBORUNDUM makes the *right* wheel for any metallic or non-metallic cut-off job.



"RED-I-CUT" Waterproof Paper has revolutionized wet sanding operations in thousands of shops. With its new flexible backing and a new resin bond, you can confidently expect it to deliver a faster cut, a better finish, and up to 50% longer useful life on production runs.

RUBBER BUSHED WHEELS, used with rubber washers, are being widely adopted because they reduce vibration to a minimum in portable grinding. Results: less operator fatigue, greater output and longer wheel life. Every user of portable equipment should investigate these cost-cutting wheels.

V1 BOND, outstanding performer in internal grinding, is now saving money for users of mounted wheels and points. Why? They last longer, cut faster, hold form better, because V1 Bond is stronger, free-cutting. And for quality of finish obtained, they're unsurpassed.



"T-61" UNIVERSAL HUB CONTACT WHEEL ASSEMBLY now combines economy of longer belt life, achieved by serrated wheel surface, with equally sharp saving in wheel replacement cost. Changeable "tire" idea multiplies wheel versatility too. Hundreds of abrasive belt users are enthusiastic about results.

You profit when you STANDARDIZE on Abrasives by CARBORUNDUM

When you do business with the *only* supplier of all the types of abrasives there are, certain unique advantages are yours to enjoy:

FIRST, a control of abrasive quality which is constant, identical, and dependable—no matter what abrasive method you use.

SECOND, a technical advisory service which brings to your attention every new development in the entire field of abrasives.

THIRD, a refreshing approach to your abrasive problems which only a complete-line source, assuming complete-line responsibility, can offer. Recommendations from CARBORUNDUM are free from bias, completely objective... thus entirely dependable.

For further information on any of the ideas shown here, call your CARBORUNDUM salesman or distributor, write Dept. PE 80-31.

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MARK

...the ONLY source for EVERY abrasive product you need

80-31

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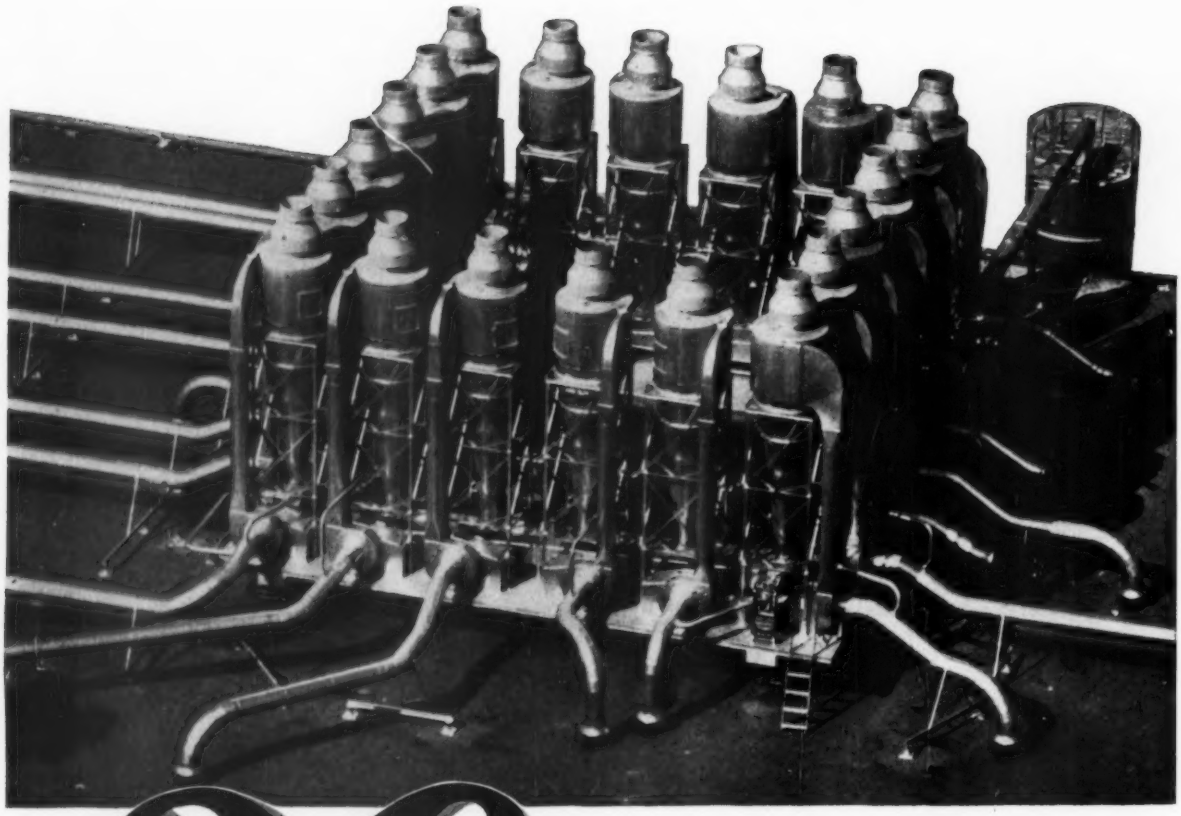

20 collector KIRK AND BLUM DUST CONTROL SYSTEM

removes 99.5% of dust at FORMICA

A good indication of the efficiency of KIRK & BLUM Dust Control Systems on dust particles of any size is given by a recent installation where small particles are the principle dust load.

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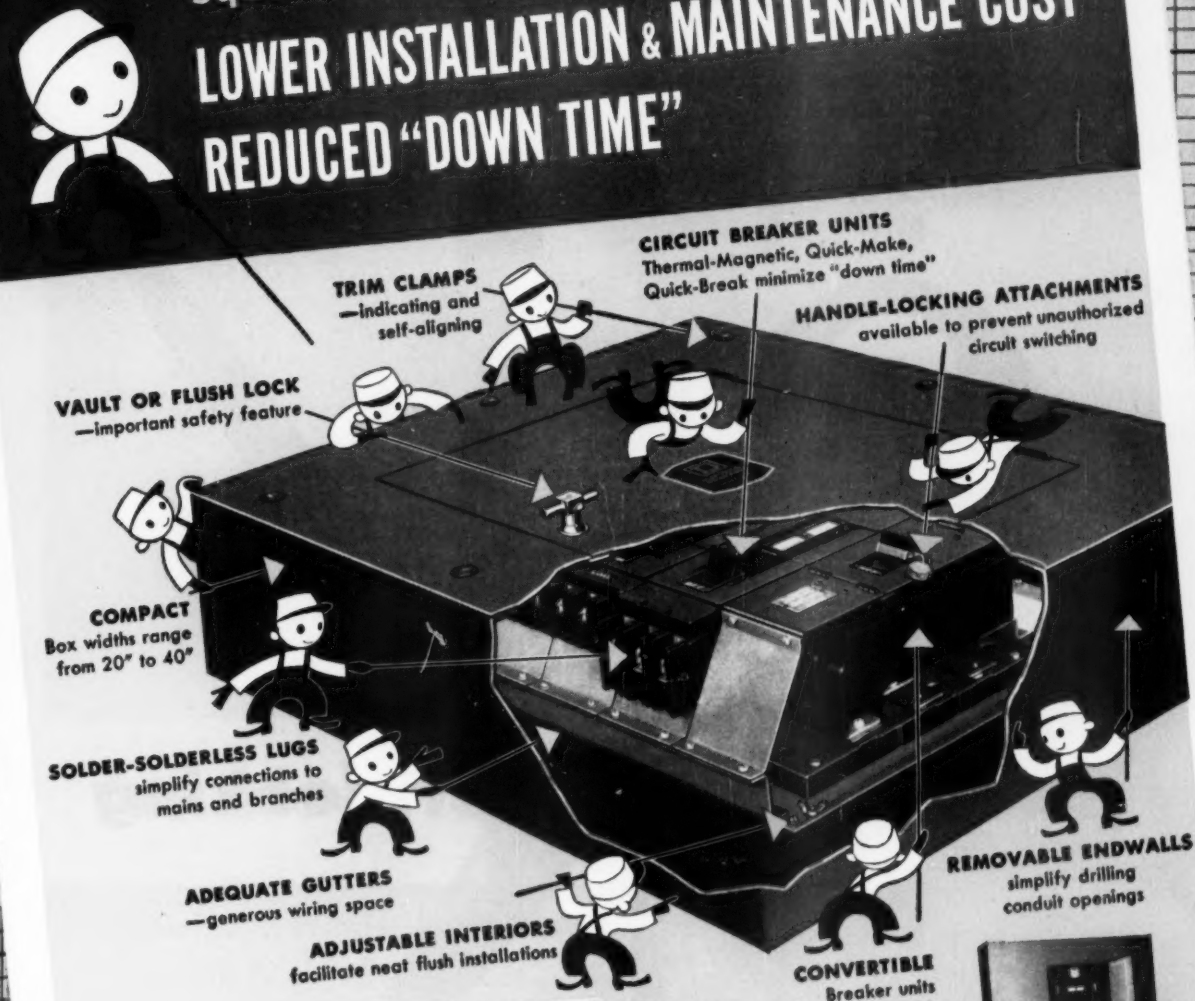

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DEPARTMENT OF GENERAL ELECTRIC COMPANY
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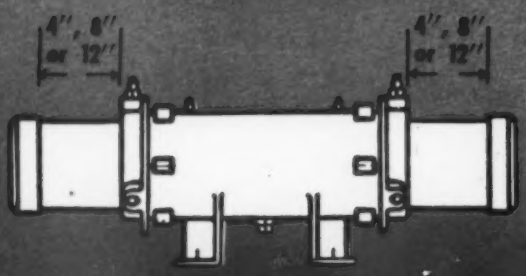

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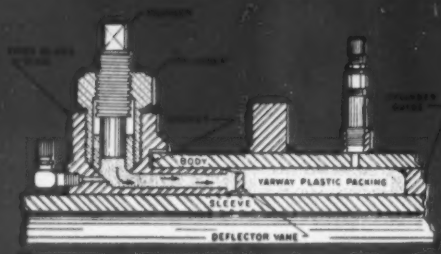

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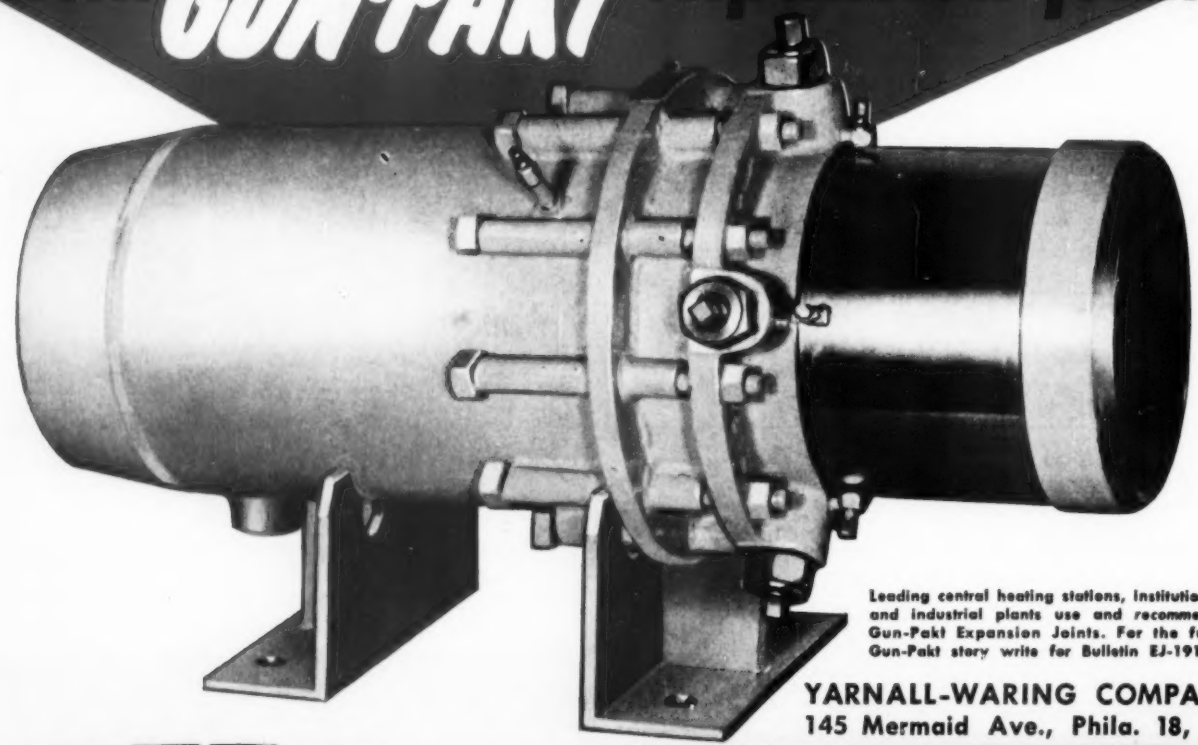

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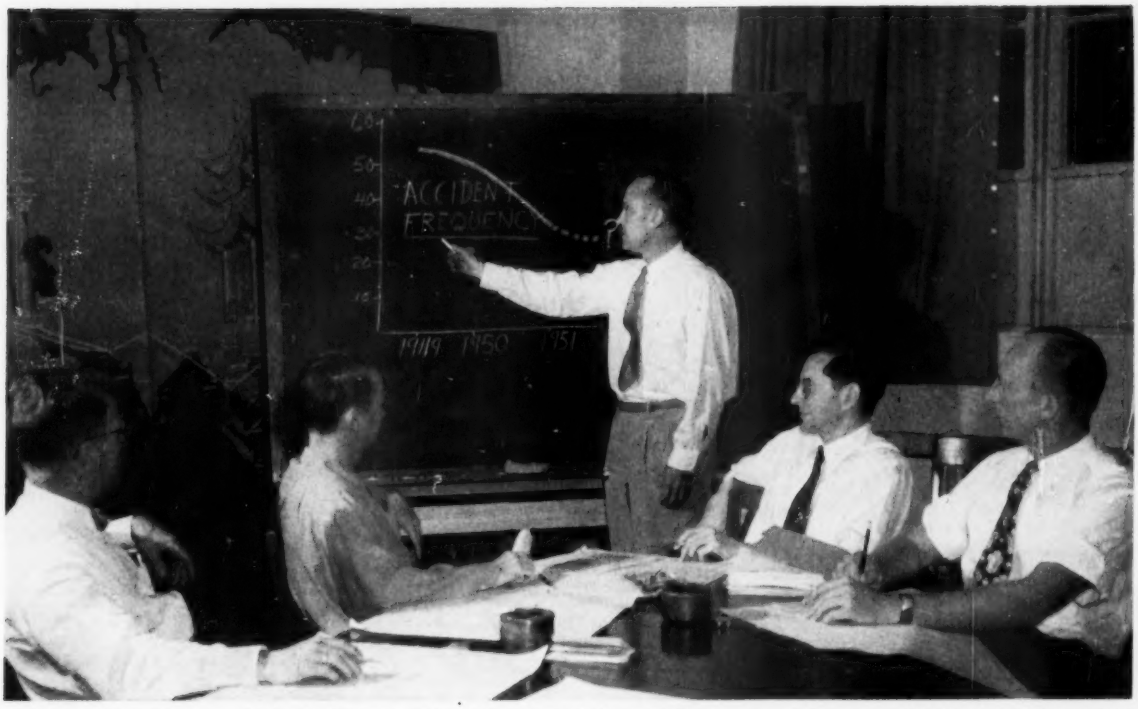


Accident loss control committee looks with satisfaction at declining accident rate. Author of article is second from right

Accident Loss Control Committee Cuts Severity Rate in Half

Accident committee set up program to reduce accidents . . . Program considers: . . . Equipment, its selection, use, maintenance . . . Materials handling . . . Personnel

By W. E. ADAMS, Plant Maintenance Superintendent, Pan American World Airways

IN SEEKING OUT areas where costs could be reduced, accidents in and around the Pan American World Airways, Latin American Division, Miami, Florida, base were found to be a factor that could reward study and corrective action. An Accident Loss Control Committee was formed in June of 1950 with the result that the present accident severity rate has dropped to one-half that of 1950; and the frequency rate has dropped 20 per cent.

The company first discussed methods to be followed with Hartford Insurance Co. This preliminary study led to the formation of the Accident Loss Control Committee, made up as follows:

The Plant Maintenance Superintendent, Chairman
The Industrial Safety Superintendent (Personnel)
The Industrial Engineer
Superintendent of Fire Protection (from Plant Maintenance)
The Division Insurance Officer
The Area Superintendent (this member varies, as he is always superintendent of the department being examined that month)

The program adopted was a development of the Hartford Engineering Service. Basically, it attacks on three fronts:

1. Equipment, including selection, use and maintenance;
2. Material, placing and handling;
3. People (training).

The first activity of the committee was to develop publicity to point out to all employees the high cost of injuries—to themselves.

Next, the committee instituted an Accident Investigation Research form. This had a two-fold purpose:

1. It requires foremen to investigate an accident and to fill out the form. In this way he becomes familiar with the cause of accident and correction.

2. It gives the committee information to work on, to correct practices, abuses, or conditions. Sometimes the report indicates a need for additional training or instruction.

One of the functions of the committee is to make observation studies of specific operations. Such an example was watching all phases of cargo loading at night. This study resulted in reinforcing the loading ramp from warehouse to plane. It had been designed originally for hand trucks, but they were actually using automotive equipment.

In another case, a study of truck-to-aircraft refueling resulted in improved lighting to decrease danger. Men riding on forks between load and truck was another finding that called for enforcement of safety regulations.

In observing possible hazards in the hangars it was noted that all the large lights overhead were 220 v. Both wires were hot. Normal switches that turn them off still leave one wire hot. Correction: Each light was provided with a disconnect plug adjacent to the fixture to eliminate this danger.

Many standard safety practices were in force prior to the forming of the committee, but committee investigation brought about an increased

use and better placement of slip-resistant treads, and enforcement of usual regulations such as immediately wiping up all spills.

Primary cause of accidents was found to be carelessness or lack of vigilance. In the case of a man working around an airplane, he is not likely to walk into a revolving propeller, but in walking under the plane, he may hit his head on an antenna post. In another case, if a man is working up high, he is careful; it is when he is on the ground that he pays less attention to his surroundings.

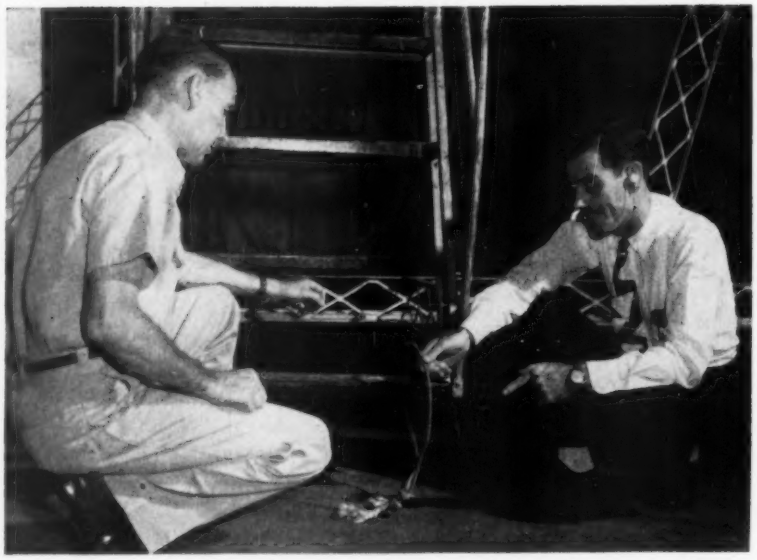
One of the most effective means used in the program has been the appointment of voluntary safety observers in each section of the plant. These men are appointed for a period of 3 months and keep their eyes open for any momentary lapse of vigilance or dangerous practice. For example, a volunteer safety observer may hand a man a pair of goggles to protect his eyes from flying particles or suggest other corrective measures, depending on the situation. Such observers have been invaluable in promoting safety education on the job.

In starting out to study the plant section by section, the most costly area, or the one in which accidents occurred most frequently, was taken first. If someone keeps getting hurt on a certain piece of equipment, it is up to Plant Engineering to take corrective action.

Speed limits have been put on automotive traffic and in some areas automotive traffic is prohibited.

Two first-aid stations are kept open continuously with a staff of 10 to 12 nurses to handle emergencies.

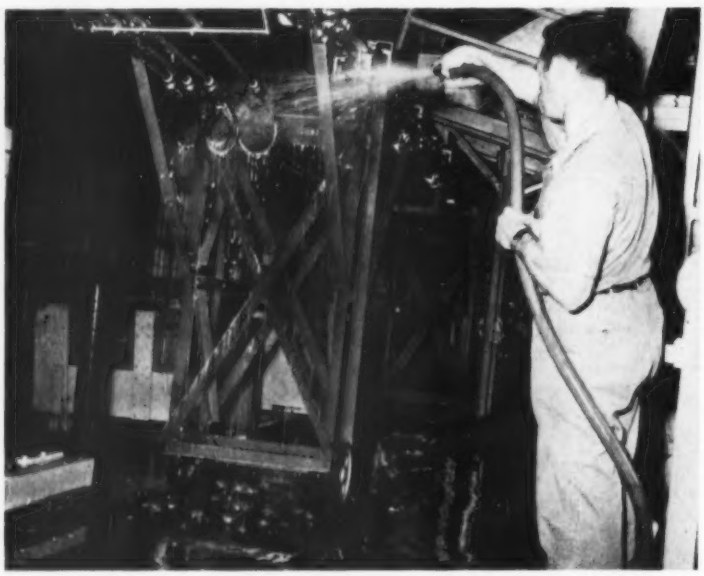
That the over-all program has proved effective is reflected importantly in the company's accident cost reduction. All company insurance rates reflect directly both the severity and frequency rate within the plant. The biggest saving, however, is the unseen cost of lost time.



Even the little things can cause big accidents. This rope tied around the tail dock step could trip a person using the steps and possibly cause a serious accident

Wire for Wet Locations

THE WET END of a paper mill is one of the world's roughest services for electric wiring. The photograph shows only one abuse, daily drenching when the whole area is washed down. The air itself is hot and steamy, floors are wet, and in many locations wiring is subjected also to an occasional dose of chlorine, caustic soda or other chemical used to digest or bleach the pulp.



Picture taken in Ecusta's bleach building shows an expansion joint in the conduit under a conveyor. Note that the conduit and the exposed neoprene-jacketed wire are hosed down along with everything else. This daily wash-down is a standard procedure throughout the wet end of the mill

In many paper mills it is becoming standard practice to use neoprene-jacketed wiring for such service. Such wiring is being used by the Ecusta Paper Corp., North Carolina, a producer of fine cigarette paper.

When the Ecusta plant was built in 1939, it was wired in the wet areas with type RW (water resistant) building wire jacketed with saturated braid. But the triple threat of moisture, heat and chemicals was too much—failures began to occur after 5 or 6 years.

The company switched to neoprene-jacketed wire and now uses it exclusively in all its wet locations—both for new wiring and for replacement of the old braid-jacketed wire when it fails. Many thousands of feet of it have been installed in the last 6 years, most of it in power and control circuits (600 a-c) in the plant's pulp mill, bleach building, paper machine area, and electrolytic cell room (where chlorine for bleaching is produced from salt). It is also used for all 5,000 a-c feeder circuits throughout the plant, and for outdoor wiring.

Photos: DeBothezat Fans, Div. American Machine & Metals

Duct work leads from the metal plating tanks, where corrosive fumes are emitted, to the ventilators on the roof. Placement of the fans on the roof permitted the exaust duct work to be as short and direct as possible with only slight turns

PLANNED Fan Installations Pay Off in Efficiency, Service

This article shows how proper selection of equipment plus correct installation pays dividends at one plant

THE PROBLEM of exhausting steam, excessive heat, fumes, smoke and other irritating or dammaging vapors which are by-products of manufacturing processes has long been a source of trouble for many large plants. The Winters and Crampton metal plating plant of Grandville, Michigan has found a very satisfactory solution to their problem ot this nature according to Propeller Fan Manufacturers' Association.

Corrosive fumes are emitted from the tanks where stove and refrigerator hardware is plated. In order to protect the health of their employees and prevent damage to their plant machinery, it was necessary to work out some system of exhausting the fumes. To do this job, the duct work was attached to the metal plating tanks and then connected to four exhaust units on the roof of the building.

The particular fans that were chosen are direct motor-driven fans with divided housings. The fan wheel itself is 24 in. in diameter with a top speed of 11,000 fpm. The 5 hp motor is mounted in a separate chamber, open to the atmosphere but isolated from any exhaust fumes because of the divided housing. Because the fumes being exhausted at Winters and Crampton are corrosive, the motor is protected by being mounted in a separate chamber of the unit.

This choice of exhaust system was particularly well-suited to the problem at Winters and Crampton' plant because they needed a set-up which would be as simple as possible to install. The equipment in the plating room necessarily takes up a great deal of space and limits the area available for installing an exhaust system. Placing these split duct, direct-driven ventilators on the roof made it possible to omit

elbows, sleeve band connections, and separate motor mounting and cover. This simplified the duct work, taking a minimum of space and making for a trim appearance.

Plant Engineer Norman Davis reports that the roof ventilators' performance is equal to or in excess of their rated capacities and says that they are doing a very satisfactory job of fume removal. In addition, the ventilators are proving easy to service, since the weather tops may be removed to give direct access to the fan wheels.

Type of Ventilation

The Winters and Crampton installation is an example of "system ventilation," applicable to many types of industrial operation. In system ventilation, the object is to control heat or fumes at the source of emission. This is done with a combination of ducts and fans connected to the specific area producing the unwanted vapors.

Industrial exhaust systems may, on the other hand, be of the "general ventilation" type. Here, the purpose is total replacement of air in the room area. Exhaust fans without ducts are mounted in side walls, monitors, or on the roof. Placing of the units is important, in order to produce the most effective cross flow of air.

In either case, plant engineers have recognized the fact that to get the most out of an exhaust system, it should be designed individually for each situation's special needs. For maximum service and economy, several basic principles should be considered in selecting fans for industrial installation.

With the general type of ventilation, location of the fans and intake areas is important. Fans should be placed to blow with prevailing winds, and intake areas positioned to take advantage of positive pressure produced by prevailing winds. Fans should not be located to blow opposite each other if it can be avoided. Separation by at least six fan diameters should be planned in locating units. Fan intake areas should be of at least 20 per cent greater than the fan wheel discharge area.

Where noise is a consideration (as it usually is because of worker morale), care should be taken in selecting just the right fan. The fan tip speed is suggested by ventilating engineers and consultants as one index of relative loudness. Composition of the air that will surround the motor is another point to consider. Where the air will exceed normal temperatures, an insulated motor can be used or external cooling can be provided. Blast coils can be added where cold weather is a factor. If the air over the motor is hazardous in composition, an explosion proof motor or a motor mounted out of the air stream is essential.

In designing system type ventilation, where duct work is used, as at Winters and Crampton, experience and research have shown several additional points to be important.

The fumes or vapors should be collected as near the source as practical, and duct work should be as short and direct as possible. Duct velocity should be kept as low as practical, considering the fumes to be handled and the distance they are to be carried. Where turns in the ducts can be avoided, they should be. But if necessary, long radius elbows should be used to keep resistance to a minimum.

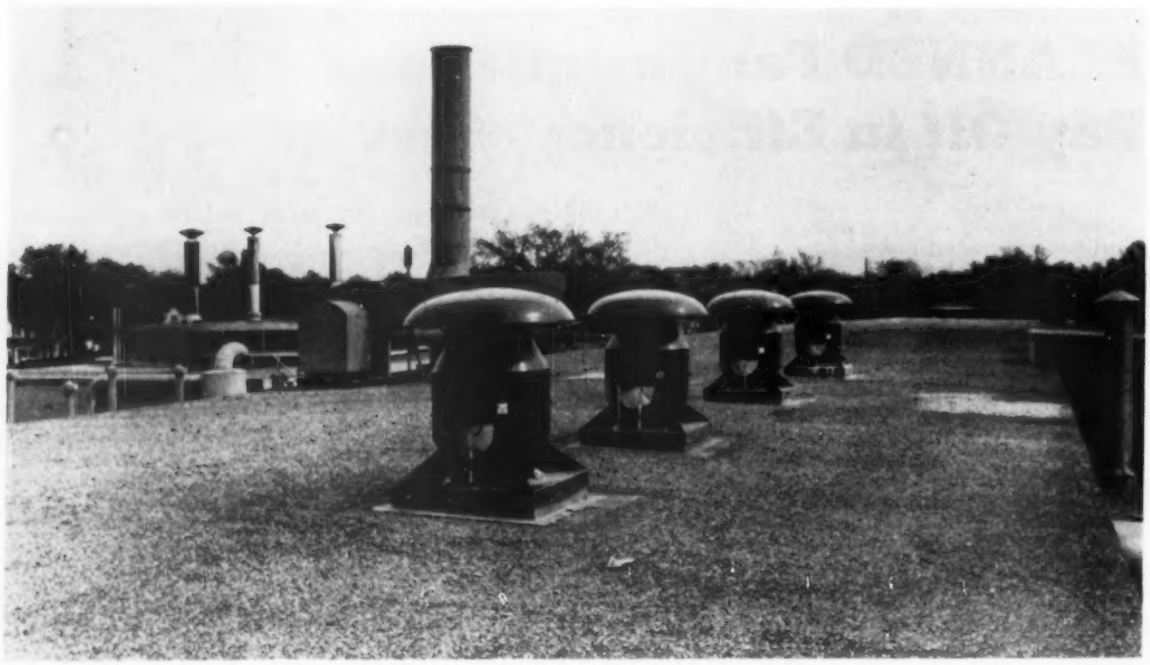
Fan Selection

In selecting the fan unit to be used with a duct system it is best to choose a fan having a reserve capacity beyond the pressure-volume point determined by the duct resistance. If corrosive or abrasive conditions are encountered, the fan parts should be coated with special paints for protection.

At Winters and Crampton, many of these points had to be considered in selecting the proper fans. The duct work was made as short and direct as possible by locating the exhaust units on the roof. The corrosive nature of the fumes was dealt with by using the split duct fan which keeps the motor out of the fumes. The location of the fans on the roof did make it necessary to cope with weather conditions, so the units were provided with weather tops, and the housings coated with six coats of a weather proofing material.

This careful engineering at Winters and Crampton has paid off in a ventilating system which does the job well and is easy to maintain.

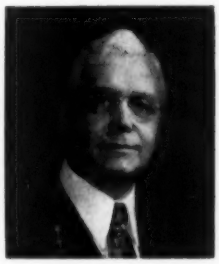
Four ventilators are installed on the roof of the Winters and Crampton plant at Grandville, Mich. The motors, mounted between the air flow ducts of the units, are isolated from the corrosive fumes being exhausted but open to the atmosphere



Plant Engineering *presents . . .*

a series of articles on industrial illumination and closely-related subjects authored by Leonard V. James. The articles will appear every month for the first part of the year; starting with July they will appear bi-monthly. Readers who wish to reserve reprints of the entire series may do so by writing to The Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill., before February 27, 1953.

About the Author



Leonard V. James is well-known as an Illuminating Engineering Consultant; his association activities bear witness to this. He has been chairman of the Chicago Section, Illuminating Engineering Society; a Regional Vice-President; Chairman, School Lighting Committee; Chairman of American Standards Association Sectional Committee A-23 on American Standard Practice for School Lighting.

Mr. James' field experience is broad and varied. He was Field and District Engineer for the Lamp Division of General Electric Company for a period of nearly 30 years. In his present capacity as consultant he has served many industrial, commercial and municipal bodies. Academically, Mr. James received degrees of BS and MS in Electrical Engineering from the University of Illinois and was a member of the electrical engineering faculty at Illinois for several years. He is a Fellow of the Illuminating Engineering Society.

Because of his broad experience, careful craftsmanship and practical approach to lighting problems the editors of PLANT ENGINEERING consider Mr. James eminently qualified to advise its readers on industrial illumination.—The Editors.

These articles are coming in future issues –

Subjects of articles which will appear in future issues of PLANT ENGINEERING are planned to present information on those phases of industrial illumination of greatest concern to the readers. Articles will appear in approximately the batting order shown below.

Fluorescent Light Sources
Incandescent and Gaseous Light Sources
Significant Factors in Illumination Design
Lamp Procurement and Stock Control
Balancing the Account for Industrial Lighting
Direction and Color of Light for Inspection
Short-Wave Radiation for Inspection
More About Visual Environment in Industry
Germicidal Radiation in Industry
Lighting the Industrial Office
Lighting the Industrial Food Service Department
Yard and Protective Lighting

1....

LIGHTING for SEEING in INDUSTRY

This is the first in a series of comprehensive articles on industrial lighting. It relates briefly the background of lighting history, tells the "whys" and "wherefors" of physiological and psychological reactions to lighting either good or bad, and lays the basis for the future articles in the series . . . short case histories to illustrate described principles

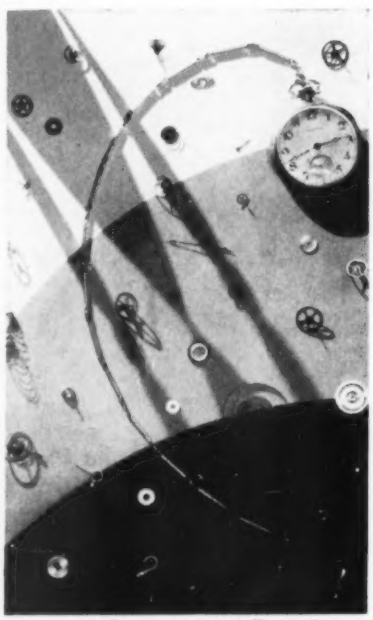
By **LEONARD V. JAMES**, Illuminating Engineering Consultant

PLANT ENGINEERS need not be told that lighting practice in industry has changed very radically since the turn of the century, particularly in the last twenty years. But how many have analyzed these changes to learn the trend and the reasons for that trend? Only by doing this, can we look into the future (extrapolate the trend, in a way) and assure that lighting expenditures made today will really be permanent capital investments, the new lighting being such that it will not need to be changed again in the near future. The need for this precaution is greater now than it used to be when changes were relatively inexpensive. Both labor and lighting equipment are now more costly and mistakes must be avoided if at all possible.

To refresh the reader's memory (or to advise the younger readers) let us review briefly what has happened to industrial lighting in this period. In 1910, the best that could be said was that the lighting served to dispel the darkness—to some extent. Footcandles were less well known than footlamberts are today. Purchasers and salesmen thought in terms of fixtures only, frequently to be lamped according to the whim of the user.

During the time of the first World War, a great discovery was made. Lighting was found to be a tool which could be used to expedite production. Footcandle meters had helped application engineers to know and comprehend that term. And in the early 1920's, specific lamps were being used in reflectors in such a way, and in the better installations, so that from 5 to 10 footcandles were being delivered at the work. Dr. M. Luckiesh of Nela Park published a book "Light and Work." Lighting for Production was on its way. By the end of this period, there were some installations delivering more than 10 footcandles.

In the early 1930's, the so-called Science of Seeing was announced and publicized. The idea of the "human seeing machine" was introduced. This proclaimed that a workman sees a pattern of varying brightnesses and colors, and that the amount, direction and color value of the light available on this pattern is a determining factor. Without light, even a person with excellent eyesight would be as helpless from a seeing standpoint as one who is totally blind.



All illustrations: General Electric Company

Fig. 1. Four foundamental factors in seeing are brightness, size, contrast and time. Color is usually secondary factor

Factors in Seeing

The four fundamental factors in seeing were explained—brightness, size, contrast and time. One discerns "brightness" (not glaring brightness in detailed vision, but rather the volume of light energy directed toward the eyes from the details of the object viewed). More of this brightness is needed to see the smaller "size" details or objects. This is noted when a workman takes a scale to the light in order to read it more accurately. Seeing the scale could, however, be improved if the "contrast" between the graduations and the surface is increased. This may be done indirectly when the sky or some other large lighted area of relatively low brightness is reflected from the surface, the graduation markings remaining dark. The "time" element is understood when one searches in a drawer or box of parts for a particular small nut, finding it only when he takes time to look carefully.

In each of these cases, it will be noted that increasing the illumination and thus the "brightness" tends to compensate for poor "size," "contrast" or "time" as found. So illumination levels or footcandles became recognized as of paramount importance and by the end of the 1930's many industrial (and other) installations were providing 30 footcandles and more of general lighting, some with much higher levels of local lighting at the work.

An objection developed, however, to very high levels of lighting, not on account of the levels themselves, for literally thousands of footcandles may be available out of doors, but because of the heat. Less than 10 per cent of the energy given out by

Credit for portions of reference material is gratefully made to both Matthew Luckiesh and Charles L. Amick.

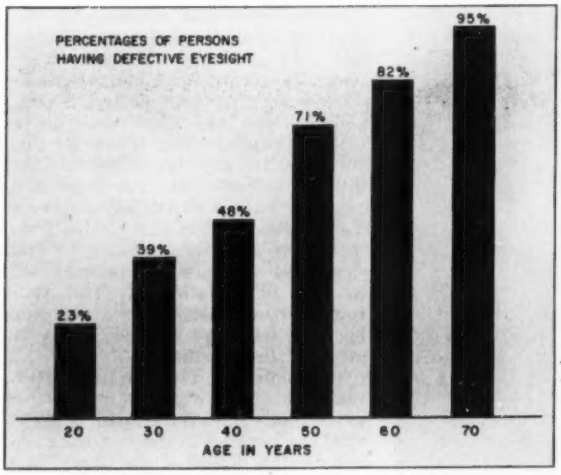


Fig. 2. While defective eyesight can be corrected in part with spectacles, better lighting is usually required in such cases than for people whose sight is normal. This chart shows how age affects percentage figures of defective eyesight

Fig. 3. By sighting through fogged discs until the details of a job become obscure, comparisons of visibility of various tasks can be made. By calibration, these can be translated into their relative footcandles to provide equal visibility

an incandescent lamp is in the form of light. The rest is heat and much of this is radiant heat due to the high temperature of the source.

Advent of Fluorescent

As so often happens in time of need, a new development provided relief. The new development in this case was the fluorescent lamp, emitting at least double the proportion of energy per watt (including the ballast loss) in the form of light. Also the sensation of radiant heat here was perhaps a fifth as much as that from the incandescent lamp, the fluorescent lamp or tube being almost cool. A further advantage was in the reduced brightness of the source, permitting a greater exposure and therefore a higher utilization of the light with at least equal comfort.

A contributing factor to the ever increasing levels of illumination was economic in nature. The unit cost of lighting was actually getting less, dollar-wise, while the other elements in the cost of production—labor, materials, capital investment in building and tools—were increasing. It was therefore natural that an increasingly greater use of lighting for production should be in order, approaching the point where more would represent no justifiable increase in benefit.

An interesting incident occurred at about this time. The writer was approached by a plant engineer for a very large machine shop where virtually all of the work was in exceedingly fine detail and extreme accuracy was important. In excess of 30 footcandles of excellent general lighting was in use, from fluorescent lamps, in this new plant, and still the workers insisted on having local lighting at their machines.

In the discussion it was pointed out that, while the general lighting of the plant was superior to what was available in common use at that time, still workmen, even in the old shops of the day, had perhaps hundreds of footcandles at their work from reflectors on their machines or near them. Naturally, therefore, the general lighting alone could not give complete satisfaction for the work being done.

Brightness Balance

Then why have the general lighting? This may appear to be an unnecessary question. Anyone who has observed two shops, one with good general lighting plus such local lighting as is needed and the other with the local lighting only, will concede that the former is to be preferred. But why?

The answer to this question is found in the fact that the eye is not restricted to the job ahead and that excessive variations in the total visual field or pattern affect the eye adjustments and also provide psychological distractions.

Most people are surprised to find that their complete visual pattern extends fully 90 deg, from the center line of vision, to the right and also to the left, 45 deg or more up and nearly 90 deg down. Try walking down the road, eyes straight ahead, and note at what place the corner of the building beside the road can no longer be seen. Or walk through the plant, eyes horizontal, and note to how high an angle the lighting fixtures are discernible. At this point try another interesting experiment—raise the hand or some other object to a position between the eyes and the lights; greater comfort as well as improved visibility results.

Now, removing and then replacing this screening object, note the pulling or distracting influence of these overhead sources. If this experiment can be done in two rooms, one with a very dark ceiling, not lighted, and the other with a painted ceiling, illuminated with part of the light from the reflectors, the latter will be marked as the more comfortable.

While still in the rooms described above, try to ignore the overhead sources even when not screened and note the details of the work ahead

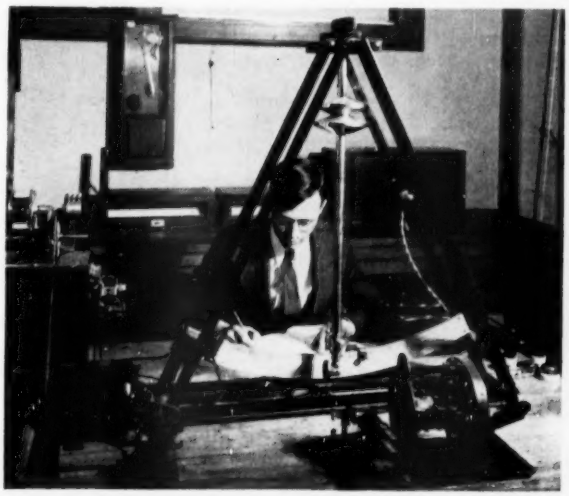


Fig. 4. Laboratory equipment for the study of the influence of various factors on operations dependent on seeing include a pendulum timer

Fig. 5. Required to press a knob at the end of each page but without taking his eyes from the book, the subject is in position to register nervous muscular tension through his finger tips. This tension decreased as level of illumination increased

and the improvement in the room with the light ceiling, in the accuracy and ease of seeing these details. If the details are very fine (threshold vision, at the point where seeing them is barely possible), the results will be even more effective.

Excessive darkness of surrounds is only less distracting and harmful in seeing than is excessive brightness. Trying the same experiments in the plant using local lighting at the work, and with the general lighting successively turned off and on, will demonstrate this.

The above paragraphs, however, merely state again, although more completely and in more practical terms, that too great a variation in the visual pattern is objectionable. Why?

Human Seeing Machine

The answer seems to be partly physiological, partly psychological. The eye automatically adjusts itself to the task at hand, the speed and accuracy with which it does so being almost miraculous. Changing the view quickly from one position to another demonstrates this, all the details of the new picture (pattern) appearing to become visible immediately. This does not apply when going from a bright exterior to a dark interior, or the reverse, as here the eye must make a positive adjustment which, incidentally, it does much more rapidly when the second brightness level is high than when it is low (the higher brightness "hurts"). The same thing applies when the change is between places of different brightnesses in the plant, even at the work itself.

But the eye cannot adjust itself satisfactorily to two radically different conditions at the same time. The fact that one of these conditions is at the side or above or below the center line of vision merely reduces its influence (like car headlights in the third lane over as compared with those in the adjacent lane on the highway. The result is two-fold—imperfect adjustment for the task and for the disturbing influence, plus a strain (tug-of-war) within the eye which causes fatigue, failure to concentrate, inattentiveness. Coupled with psychological distraction, these influences result in poor operation by the most expert and willing workman.

So lighting became recognized as a production tool in the hands of a human seeing machine, the efficiency of which, at once and throughout a long period of time, is influenced by the effectiveness of that tool. As the idea became more generally accepted, the greatly improved lighting and seeing conditions of the later 1940's and early 1950's appeared. The trend is very definitely toward out-of-doors conditions, where general lighting comes from the sky dome and from the subdued reflections in the general surrounds, while contours and sharpness of vision are accentuated by the direct sunlight. The surrounds may be relatively dark green because they are lighted by thousands of footcandles.

Impractical? Yes. Besides, such tasks as office work could not be performed comfortably in bright sunlight because of the resulting excessive brightness of the paper. One might recall that white does not appear in any quantity in nature except in the form of snow or fleecy clouds, both of which are uncomfortably bright when highly illuminated.

How far then will the trend toward this ideal continue and what will limit it? The answer to the second question is of course economic and this will be covered in a later article. No concern can afford not to have whatever lighting will provide the most profitable operation, but on the other hand no concern can afford to have lighting that does not contribute to an increased profit, everything considered.

Let us return to the Science of Seeing for an indication of the answer to the need for possibly even better lighting than the best of pres-

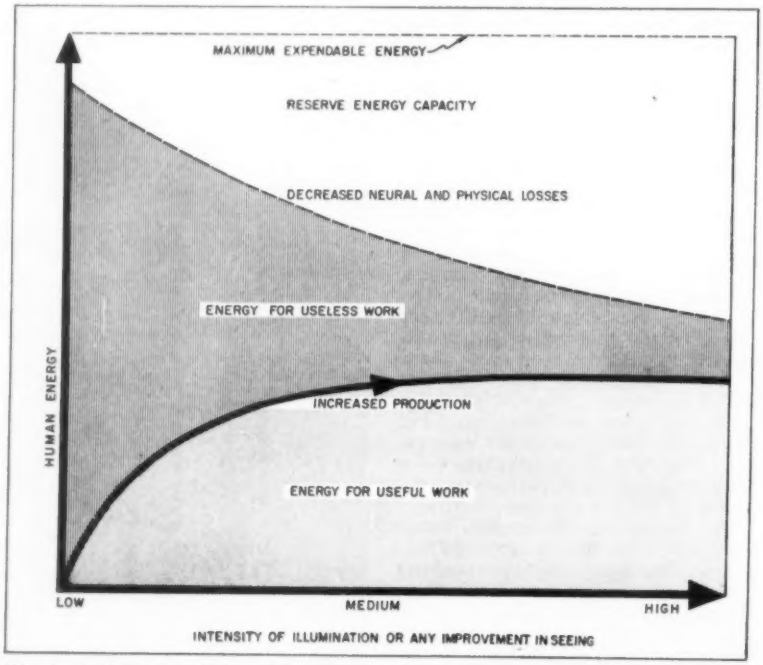


Fig. 6. As level of illumination is increased, total energy expended to perform a task decreases, allowing for greater reserve capacity while production increases

ent standards. Comments on some of the laboratory investigations follow.

An early research was on the extent of eye defectiveness and this was analyzed by ages. (See Fig. 2.) It is not contended that all of this defectiveness could be avoided (some is natural and occurs in all eyes as they age). Also much of it can be corrected, at least in part, by properly fitted spectacles (eye-crutches).

Defective Vision

But the investigation disclosed that, whereas one in four among people 20 years old have defective vision and probably should wear glasses, this is true of two in four among people 40 years old and four in five among those 60 years old. This defectiveness, even if partly corrected, results in slower vision and greater difficulty in seeing small detail, particularly where poor contrast prevails, all of which conditions can be improved by better lighting.

A "visibility meter" was devised by means of which a progressively fogged disk is rotated between the eyes and various seeing tasks, the point at which the details of the tasks become undiscernible being noted. By calibrating this meter, the relative footcandles required for equal visibility of the tasks was determined. Seeing with dark thread on dark cloth, for instance, was found to require, for the same visibility, about 100 times as much light as does reading ordinary book print. Current Recommended Footcandle Tables, available from various authorities and manufacturers, are based quite largely on investigations with this meter.

The influence of glare in the direct field of vision also was studied. This showed, for instance, that lowering a bare lamp into the line of vision could reduce the ability of a workman to see by over 50 per cent.

A literally tremendous amount of work was done in studying the influence of the four fundamental factors (brightness, size, contrast and time) on the amount of illumination needed for equal visibility. A pendulum device to assist in analyzing these influences is shown in Fig. 4.

Passing from the task to the workman, the energy used in seeing was measured by observing his "nervous muscular tension" while doing various visual tasks. It had been noted that, when one is driving in the fog on a dark night, he grips the wheel more tightly than he would on the same road on a bright sunshiny afternoon. The difference is not a greater difficulty in steering the car but rather a more difficult seeing task, the nervous strain being translated throughout the body, even to the finger tips.

Lab Proof

In the laboratory, a subject was directed to read under different levels of illumination and the fingertip tension was measured by noting the varying pressure on a knob supported by a spring. A pressure of 63 grams was recorded when the level was 1 footcandle, 54 grams when it was 10 footcandles and 43 grams when it was 100 footcandles.

The significance of this research was not alone in the fact that the tension decreased as the illumination was increased, but also in that 100 footcandles was only about as much better than 10 footcandles as 10 footcandles was better than 1 footcandle. This indicated that the increasing benefit from better lighting is geometrical rather than arithmetrical—like the lever where a length of 8 ft is only as much better than 4 ft as 4 ft is better than 2 ft.

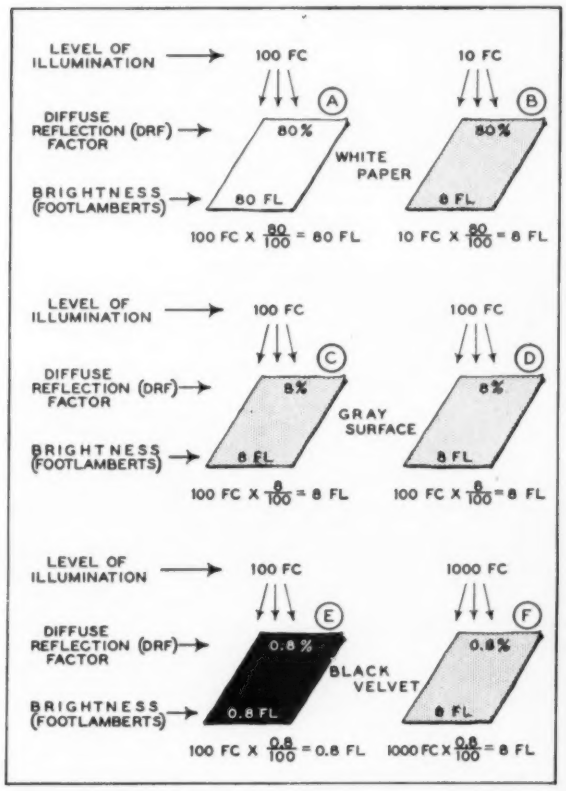


Fig. 7. Brightness is the product of the illumination level and the reflecting property of the surface. It is seen that black velvet and white paper can be made to have the same brightness by adjusting the lighting. The application, in economically providing brighter ceilings and walls, is obvious

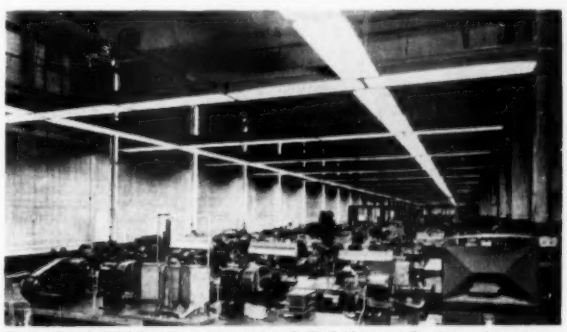


Fig. 8. A grid arrangement of lighting reflectors in areas where seeing is critical does two things: provides the same level of illumination that would result from rows spaced about half as far apart, and lights the task from all directions, eliminating shadows. Reflectors here contain two 40-watt lamps and illumination level averages 80 footcandles

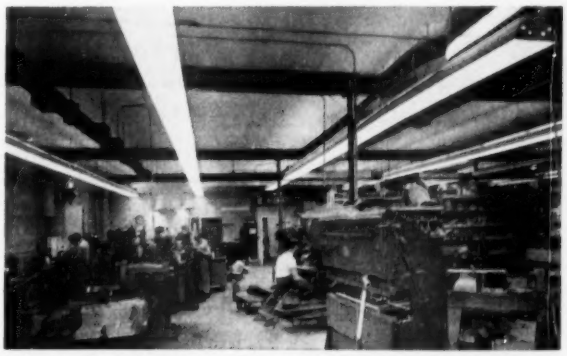


Fig. 9. The advantage of top openings in the reflectors, to direct some light to the ceiling and thus create a comfortable visual field, is obvious. The openings also help to reduce the soil accumulation on the reflecting surfaces

Fig. 10. Even though the lighting level at the floor may be adequate for foundry work, alertness and seeing comfort by the workmen could be improved considerably in this foundry by softly illuminating both the ceilings and the walls

As levels of illumination continue to be increased, the importance of this relation is startling—compare 10 footcandles to 1, 100 to 10, 1000 to 100, etc. It has been found that doubling the footcandle level will produce a recognizable improvement in seeing and this proportion has been used to represent a unit of benefit. The scale for equal and recognizable improvements would then run 5:10:20:40:80:160, etc.

From the results of these various researches and others, there has been drawn a hypothetical, but not too unrealistic, chart showing the expenditure of human energy in performing seeing tasks. This indicates the probable increase in useful production, with better visibility due to any improvement in seeing, including that due to better illumination, and also the decrease in wasted energy due to the effort to see despite the inadequate conditions, with a consequent higher efficiency of the worker.

Practical Applications

As far as all of the researches are concerned, and there have been many more than have been described, none have been pursued to the point where some improvement in operation is not found with an improvement in lighting. The benefits do not continue to increase at the same rate, however. So it becomes necessary to analyze such operational improvements with reference to the cost of obtaining them, to determine whether or not the benefits represent a net profit.

It has been shown that superior "lighting for seeing" conditions involve both the levels of illumination required for the tasks and also the brightness balance or ratios in the entire visual field needed for comfort as well as for seeing effectiveness. In appraising these conditions, therefore, one would measure, or at least observe, these several illumination and brightness values. In establishing the conditions, sufficient light would be directed from the reflectors to the work to provide the adequate level there and also enough light toward the room surfaces to make certain that the desired brightnesses will result.

One illustration shows a chart which indicates that the brightness of a surface is a product of the illumination level at that surface times the reflecting property or the reflectance of the surface. It does not seem possible that white paper and black velvet could be made to appear equally bright, merely by delivering 1000 footcandles to the velvet and 10 footcandles to the paper (in the inverse ratio of their reflectances). But the truth of this fact can easily be demonstrated.

The practical significance of this chart is in connection with obtaining desirable surround brightnesses by the suitable use of paint or of directed light or of both. This applies to all large surfaces, whether of room or of equipment. Incidentally, the only advantage of glossy surfaces is for maintenance—white blotting paper reflects as much light as does white calendered paper of similar color.

Superior Installations

A few illustrations are used which show superior lighting installations. Grid system, Fig. 8, has advantages. As far as the amount of light that will be delivered is concerned, it is equivalent to parallel rows on about one-half of the spacing between rows. The chief advantage is in the direction of the light such that any task is lighted equally well on all sides, whatever its position relative to the rows. The installation shown uses RLM type reflectors, each containing 2 40-watt lamps, and delivering 80 footcandles at the work.

The single-row installation shown employs RLM type reflectors with openings in the top such that the ceiling receives some illumination. The result is not only a more cheerful plant but one in which comfortable vision, as a production tool, is facilitated. An interested by-product is that less soil will accumu-

Fig. 11. High level local lighting is best when it is superimposed on good general lighting in a balanced brightness environment and when the worker's eyes are not exposed to bright parts of the lighting equipment nor to high brightness reflections from the work. Low brightness fluorescent lamps are used in the plant

Fig. 12. Bench lighting units here supply over 200 footcandles of supplementary illumination. General lighting of 40 footcandles is provided, while care has been taken to secure a good brightness balance in room by treatment of surrounds

late on the reflector surfaces due to the ventilation through the openings. This will be discussed further in a later article.

An extreme opposite effect is shown in a foundry picture. The horizontal illumination on the floor is quite good. But the reflector type lamps employed deliver practically no upward light, while the walls and ceiling are naturally dark. Directing some light to these surfaces not only would make the interior more comfortable, it would increase the alertness and seeing ability of the workers. A portion of the ceiling lighted from the large ladle suggests the possibilities in this connection.

Supplementary Lighting

Pictures are shown of locations in which supplementary lighting is added to the general lighting, to provide good seeing conditions for difficult tasks. It is particularly important (1) that the eyes shall not be exposed directly to the bright surfaces of the supplementary lighting equipment, (2) that this equipment shall be so located and the surfaces about the work be of such a nature that no glaring reflections will interfere with the comfortable seeing and (3) that the general lighting and the "surround" brightnesses shall be satisfactory.

During the war, the writer was consulted about a room where delicate instruments for planes were being assembled. Some 250 footcandles were being delivered to the work by local lighting equipment, but the employees complained about seeing difficulties. No light was delivered to the ceiling and walls and when this was added the complaints stopped. The eyes were simply trying to function under too great a variation of brightness.

How Much Light?

Then how much light is needed? There is no general answer to this question. Certainly enough must be provided at the work so this can be done properly. Beyond that, the best answer for industrial plants is economic. In addition, the general field of view should have some brightness, one-tenth of the task being a commonly accepted standard.

In the subsequent article referred to, a method of computing the cost of the lighting as a portion of the production cost will be explained. From this as a basis, the possible benefits to be obtained must be balanced against the relative cost of securing those benefits. Because this cost of lighting is today so small a part of production cost, it will likely be found that very few plants are most profitably lighted.

In conclusion—a careful study of the influence of various lighting levels upon seeing effectiveness, coupled with an analysis of the worker himself as a human seeing machine, justifies the importance given to lighting by the up-to-date plant engineer of today. A further careful study of the complete operation will no doubt substantiate his conclusions and may indicate that even further improvements are practical. These may take the form of spot or supplementary illumination at the point or surface of the work. Influences on seeing, however, are not limited to the work details but include the brightness conditions in the entire visual field. Finally, it can normally be shown by an economic study that even a better visual environment rather than a less expensive one is desirable.

Reprint Requests

As mentioned on cover page of this article, requests for reprints of entire series should be made before Feb. 27, 1953.

The American Standards Association approved, on August 22, 1952, a revised edition of its American Standard Practice for Industrial Lighting. The 40 pages include, in addition to the standards and explanations, a table of current recommended footcandles of over 400 items. Copies of this new standard are available at 50c each from the sponsor, The Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

Inspector finds building brickwork fault in need of repair

Type, location of needed repair are entered on Work Sheet

Building Maintenance Is a Matter of Records

Inspection is the keystone of this maintenance system . . . Records keep the system current, follow progress . . . Cost figures guard the maintenance budget

By **W. J. THUERMAN**, Plant Engineer,
Chain Belt Company, Milwaukee, Wisconsin

A BUILDING MAINTENANCE PROGRAM, instituted over 20 years ago, provides us with a sound, workable system of scheduling roof and building repairs. Designed to give complete coverage of the buildings, with a minimum of paper work and its attendant clerical personnel, the system efficiently regulates the maintenance program.

Basically, it is divided into three phases: inspection of the plant buildings; preparation of estimates and appropriation requests; and the actual repairs.

The first phase, inspection, usually starts early in

WORK SHEET

Plt #5

(BLDG. NO.) OR (YARD)	(ROOF)	X (EXTERIORS) (INTERIORS) OR (SERVICE EQUIPMENT)
SPECIFIC ITEM IN QUESTION	ESTIMATE	DETAILED REPORT OF CONDITIONS-MEASUREMENTS OF UNITS AREA, ETC.
	Labor-2 days material-3 " 24 hrs	Repair the cracks in the wall at the southwest corner.
(Contractor)	160.00	Point up large crack above railroad door.
	50.00	Sandblast and paint pipes along court wall from office entrance to shop entrance.

NOTE: IN ALL INSTANCES WHERE REPAIRS OR REPLACEMENTS ARE NECESSARY, MAKE DETAILED REPORT ON OTHER SHEET FORM

Work Sheet is first of several maintenance record forms

February of each year. The inspector, an experienced building maintenance man specially trained for inspection, takes the system's Guide Book and starts the rounds of the 14 buildings which make up the entire plant, including Plant No. 1, also in Milwaukee.

The Guide Book lists each area to be inspected, with detailed lists of those features to be noted during the inspection. The inspector, in his work, uses Work Sheets to record any and all observations he makes as to building and roof conditions.

The inspection is usually completed late in March, and the work sheets are turned in to the plant engineering office for checking of estimates made by the inspector. Here also, the necessary transition is made from estimated manhours and material to estimated dollars required. If any work recommended by the inspector is of a nature requiring the services of outside contractors, they are called into the plant to make bids on the work to be done. These figures are then incorporated into the over-all dollar cost estimate.

This phase of the work is directly supervised by the plant engineer. The completed estimates are routed to him for final approval and insertion on the system's Summary Sheets, three of which are made up for each building in the plant, to provide separate accounting for roof, interior and exterior.

These sheets, as the name implies, summarize the information from the work sheets, and include the estimates. Completed, they represent a listing of all repairs necessary throughout the plant. More important, they provide dollar totals, in labor, materials and outside services, required to pay for the repairs. These totals become a part of the annual budget presentation from the plant engineering office to management, submitted early in April of each year for approval or revision.

Generally, the revisions made by management are not drastic in nature, and the authorization to proceed with the repairs is granted. There are, of course, times when the appropriation request must be trimmed considerably, due to conditions outside the realm of the plant engineer's responsibility, therefore not considered in his summary preparation.

With an approved summary sheet—in effect an approved repairs budget—the plant engineer starts the ball rolling on the latter phases of the paperwork. Under the system this requires the issuance of work orders for each of the repairs or alterations to be made. These work orders, known as M & R orders, are issued through the plant engineering department, and are handled through this department until the job is completed. Clerks in the department keep daily records during the progress of the work, tabulating manhours, material and dollars spent.

If contractors have bid on portions of the work, the successful bidders are given written orders to proceed with the work. With all other work the shop forces are brought into the picture. This force, under the supervision of the building foreman, consists of pipe fitters, carpenters, painters, yard men and janitors. All of these men are used during the repair season.

As the various projects are complete, the total expenditures for each project are entered on a Recapitulation Sheet, which shows both estimated and actual cost for each phase of the building repair program. This comparison is of course a very valuable one for the plant engineer, for it reflects his costs as they occur, and provides him with an accurate knowledge of where the approved budget is being spent.

Experience has shown that the preferred accounting charging system is one that prorates the maintenance charges to each building.

With its long record of use in the plant, and the systematic approach which it provides in building maintenance, this three-part system is an invaluable aid in the plant engineer's continual program of building upkeep at low maintenance cost.

FORM 50 C. B. Co.

SUMMARY OF MAINTENANCE REQUIREMENTS

~~ROOF, INTERIOR~~ & EXTERIOR

Bldg. #1 (Name or Number of Building) Pl. #5 (Name and Location of Plant) (Date)

NAME OF ROOM AND ITEM	Order Number	Estimated Cost	Revised Estimated Cost	ACTUAL COST
Repair the crack in the wall at the southwest corner	7843	24.00	24.00	20.67
Paint up large crack above railroad door (Contractor)	7844	180.00	160.00	180.21
Wirebrush and paint pipe along south wall from office entrance to shop entrance.		63.00	out	
TOTALS		267.00	184.00	200.88

Form 4021 C. B. Co.

RECAPITULATION OF MAINTENANCE REQUIREMENTS

(Name and Location of Plant) (Date)

NAME OR NUMBER OF BUILDING	ORIGINAL ESTIMATE				REVISED ESTIMATE				ACTUAL COST			
	Roof	Exteriors	Interiors	Total	Roof	Exteriors	Interiors	Total	Roof	Exteriors	Interiors	Total
Bldg. 1 - Pl. #5		267.00				184.00				200.88		

Cost figures go on Summary Sheet for approval, then on Recapitulation Sheet to totalize yearly maintenance costs

AT THOMPSON PRODUCTS

VIBRATION CONTROL Brings Increased Efficiency

By W. J. COLLIER, Plant Engineer, Thompson Products, Inc.

THE benefits of straight line production with precision machinery placed adjacent to shock and vibration generating equipment have been realized by Thompson Products, Inc., Cleveland, by installing steel spring vibration isolators or resilient pads. How this was accomplished can best be explained by considering the various items of equipment which were treated in this way.

In the first place it should be explained that this company manufactures electronic, aircraft and automotive precision parts which call for the use of both heavy machinery which produces vibrations and shock, and precision machinery for finishing operations. The general problem was to install these two types of equipment for straight line production without interferences due to vibrations.

When a Bliss No. 510 punch press weighing about 80,000 lb was to be installed, the local contractor dug a pit and started to make the usual type of foundation. Then it was realized that a Globar electric furnace, and adjacent precision machinery, might be adversely affected by vibrations transmitted from the press. This had not been taken into account before as the main thought was to place the press so as to be logically located in the production line.

Consequently the design of the foundation was changed to permit mounting of the press on steel spring isolators. When the press was placed in operation it did not cause disturbances to any other machinery. This is shown in Fig. 1.

The company has had considerable experience with the isolation of hammers in several of its plants. For instance, hammers in the Cleveland plant set up vibrations which made accurate work on nearby grinders impossible. At first it was thought that it would be necessary to erect a new building in which to segregate all the hammers in the plant from the grinders, and plans for a new forge shop were actually prepared.

Since this would sacrifice the advantages of straight line production and involve considerable expense, Korfund vibration control engineers were called in. They recommended steel spring isolators and mechanical snubbers under a large concrete block supporting the hammer. This was tried and made it possible to use the hammer and grinders side by side. It also saved the cost of a new building and preserved straight line pro-

Fig. 1. Bliss press mounted on four steel spring isolators which are not shown due to location below the floor level

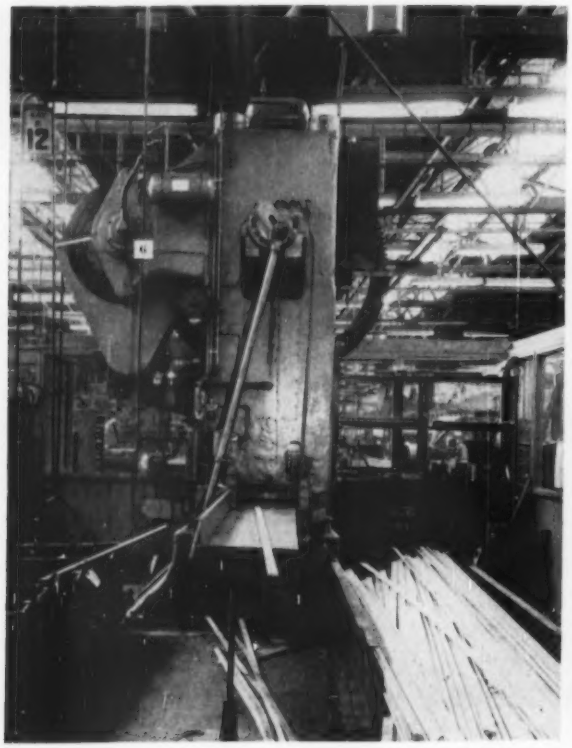
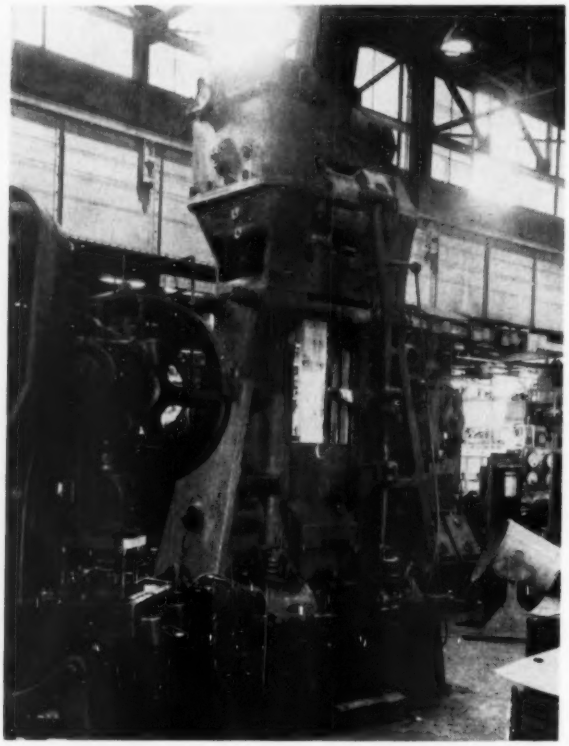


Fig. 2. Drop hammer on floating foundation supported on steel spring isolators fitted with mechanical snubbers

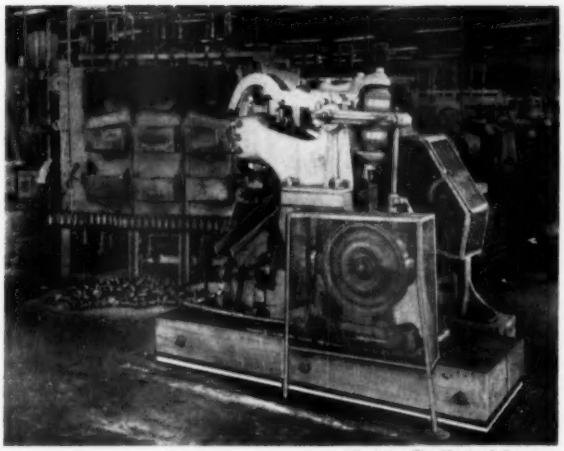


duction. Maintenance costs on the machinery and building were also reduced due to the elimination of excessive vibration. The success of this treatment was so marked that five Chambersburg drop hammers, three Erie steam hammers and one Erie board drop hammer were isolated at this plant with equally good results.

The Thompson Products Bell plant in California now has one Chambersburg hammer isolated in this manner and the company's new Harrisburg, Pa., plant has mounted eleven Chambersburg Ceco drop hammers on isolators, all as a result of the success of the first installation in Cleveland. Figure 2 shows a Chambersburg 2500 lb Ceco drop hammer (2500 lb is the weight of the ram and other falling parts). This hammer was isolated with steel spring.

A battery of high speed upright 150 pound Bradley hammers, seen in Fig. 3, caused trouble by transmitting vibrations to Globar Electric furnaces nearby. In this instance the difficulty was overcome by using pads of cork and neoprene which are oil resistant and very efficient in controlling vibration, where the weight and disturbing forces are not too great. The timbers shown in the photograph spread the load over this material and raise the hammer to the desired working height.

Another interesting use of the cork and neoprene vibration absorbing material is in combination with steel spring isolators as seen in Fig. 4. In this case ACR Chrysler Air Temp dual and single compressors are located in a special room directly over the executive offices. Vibration from the operation of these compressors disturbed the personnel in the offices below and even caused rattling of the lighting fixtures suspended from the ceiling. The disturbance was eliminated by mounting the compressors on steel spring vibro isolators with resilient pads under the latter to further reduce vibration and sound transmission. In other



All photos The Korfund Company

Fig. 3. Bradley hammer mounted on timbers beneath which is cork and neoprene to control transmission of vibration

words it took a combination of the two to take care of the conditions in this location.

A serious vibration problem was solved where one of the piston machinery production lines was moved to the second floor of a wooden building to make room for expansion. In this line it was necessary to place two Heald No. 49 Bore-Matics next to each other to get the required production in boring wrist pin holes. During the cycle of these machines there are nine changes in hydraulic pressure which transmitted shocks from one of these machines to the other and caused intermittent skips and gouges, so that it was impossible to operate the

(Continued on page 160)

Fig. 4. Dual and single compressors mounted on steel spring isolators, also in combination with cork and neoprene pads

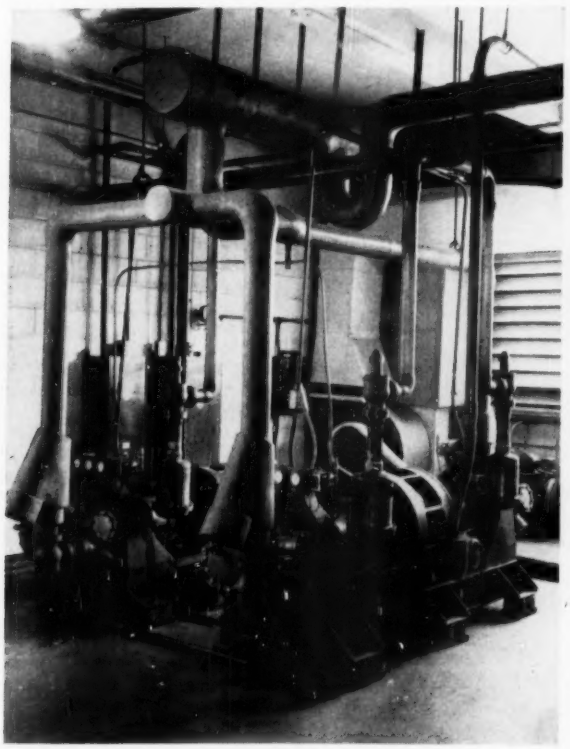


Fig. 5. High speed motor generator set, at Thompson Products, on steel isolators to prevent vibration transmission

Machine Overhaul Program Pays Dividends

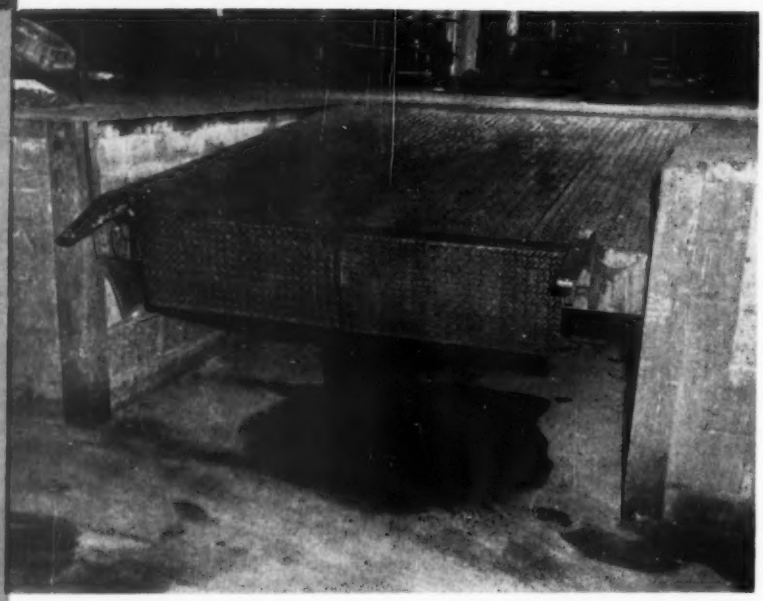
Planned system of machine repairs helps production . . . Outside shop increases availability of men for work

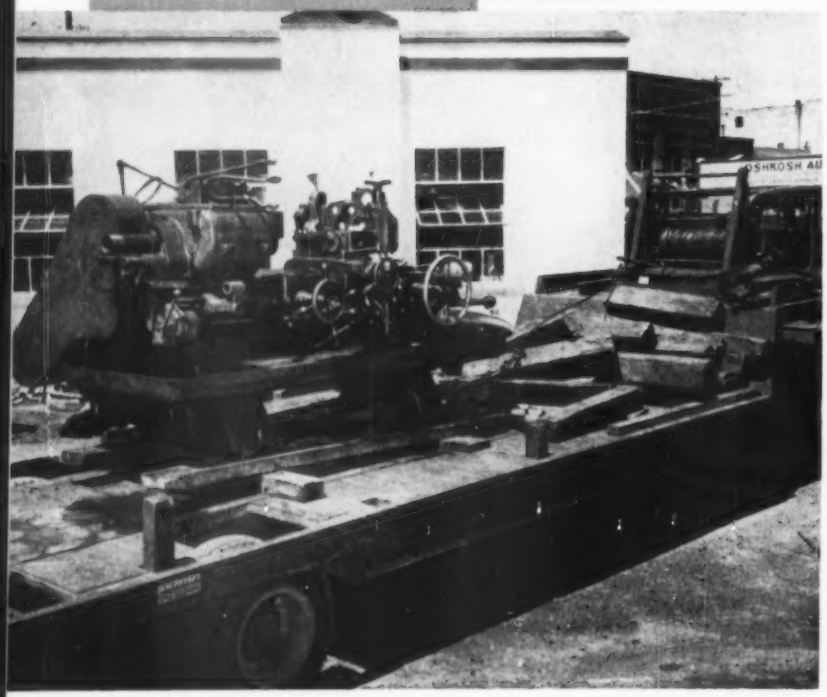
By D. E. SHOREY, Plant Engineer, Wisconsin Axle Div. The Timken-Detroit Axle Co., Oshkosh, Wisconsin

Employee holds skate used by millwrights to aid them on moving jobs

Pneumatic ramp over which machines are moved can be either elevated or depressed to suit truck platform height

Truck is standing outside the repair shop waiting to be unloaded. Winch is used to ease machines to shop floor level





TODAY'S PRODUCTION equipment and machine tools are ruggedly built but cannot be expected to last indefinitely. Trying to extend the repair or overhaul period unduly is generally recognized as false economy by American industry. Loss of quality, excessive scrap and production delays from emergency shutdowns are not consistent with a competitive market. Since Korea other factors have become important: the short supply of machine tools; long deliveries of new equipment; and unavailability of special equipment which in ordinary times would replace older machines through obsolescence.

Most companies recognize these conditions and plan accordingly. Planning is neither easy nor accurate. Underplanning is expensive through emergency breakdowns. Overplanning is expensive through increased non-productive costs and paperwork on a production or maintenance program. Too many emergency breakdowns indicate a lack of planning. Just where the breakeven point between the two systems is depends upon the individual company, the equipment involved and

the cost accounting system used.

It is evident that in a well-operated organization emergency repairs must be considered a probability and provision made to handle them without delay. Provision must also be made to keep these to a minimum by anticipating incipient failures and correcting the trouble before it happens.

This nice balance has been achieved by the Wisconsin Axle Co. of Oshkosh, Wisconsin, in a planned program and system providing for: 1. Planned repair and overhaul of equipment so as to give; a. Minimum interference with production, and b. Maximum utilization of the overhaul facilities. 2. Expeditious handling of emergency repairs.

To get the controlled overhaul and repair program rolling, the parent company, Timken-Detroit Axle Co., assigned A. J. Stork, a machine specialist, to make a complete survey of machine tools at the Oshkosh plant. Department by department, he personally checked every piece of equipment. This was no small task in itself as there are more than 700 machine tools at this plant.

This work was bolstered by the cooperation that was given to him by maintenance and production people at the plant. They supplied him with whatever background information there was available and this supplemented his visual inspection. Several weeks of this type of sleuthing were spent by the machine specialist. Notes were collected accordingly by Mr. Stork and these were later reduced and summarized in large survey sheets which presented vital information that was used to launch the machine tool overhaul and repair program. This written "blue print" gave management a general ideal of the condition of each of the machine tools and served as an aid to determine which machines needed attention.

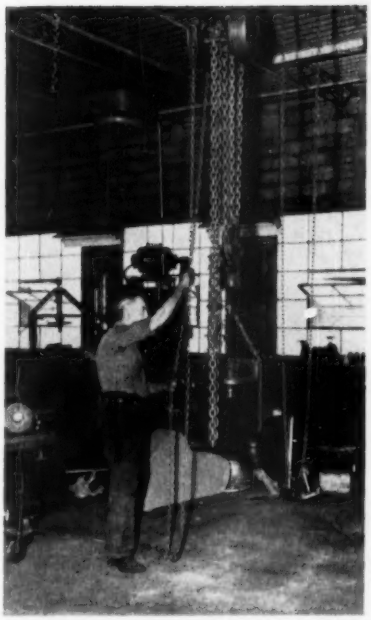
Using these survey sheets to guide him, the master mechanic at the Oshkosh plant wrote up the necessary monetary appropriation requests on a portion of the equipment that was in need of immediate attention. This was forwarded to the Detroit office for approval.

Thus the foundation for the program was set up but the problem of finding suitable facilities and manpower still existed. This responsibility was delegated to the master mechanic. He located a building in the city that was partially in use and made arrangements for the leasing of this area. A man who has had considerable experience with industrial equipment in the city of Milwaukee was approached to operate and direct the running of the proposed repair shop as a separate organization. With the installation of repair equipment and the hiring of skilled labor, the shop was ready to take on the first machine.

Now a question may arise as to how these machines are scheduled for shipment so that they do not interfere with the production department's demands. This is where the planning department enters the picture. Work that was being turned out by the machine that has been scheduled to be shipped to the shop is rerouted so that several machines are engaged on one particular job. In that manner, surplus stock is built up to keep subsequent plant production going.

When a specific production figure has been attained, the scheduled machine is taken off the line and prepared for shipment.

The plant's maintenance personnel does all the work that is required to get a machine to the shipping department. After a piece of equipment has been disconnected and unbolted, the millwright crew skids the machine and puts into use a novel method of moving the machine through the plant. Devices, called skates by some of the men, are set under the skid framework, usually in pairs. These permit the men or



Hoist for handling machine parts in the shop is geared to ease movement along overhead rail by means of a chain

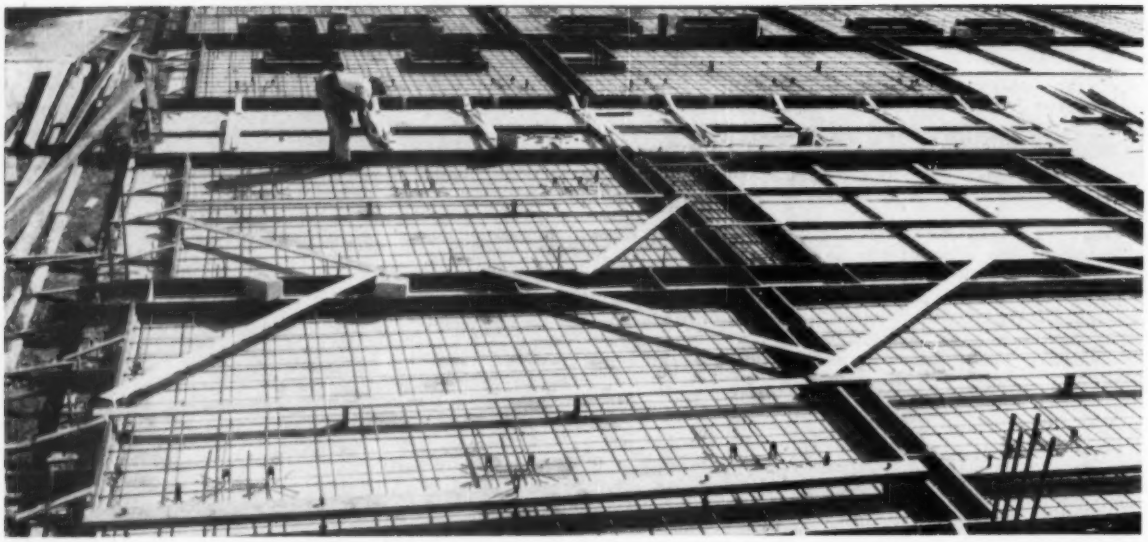
shop truck to easily transport the machine over the plant floors to the shipping point. With the aid of these skates heavy equipment can easily be turned around corners.

After the millwright crew delivers the machine to the loading dock, the outside movers take over. Here is where another good feature of the plant facilities comes in. In order to accommodate truck bodies of different heights, the shipping department is equipped with two pneumatically operating ramps. One end of these is hinged at the plant's floor level and the other can be moved up or down to align with various truck platform heights. Since the type of truck used for moving

(Continued on page 162)

Men are shown at the bed of machine that has been torn down. Machine parts have been set aside for further attention

This view of the repair shop shows that workmen have sufficient area to permit them to move freely about their work



STEP 1 Wall or panel forms are cast flat on the floor of the building itself. Forms are shown prior to being filled with concrete. Imbedded in each framework are steel reinforcing bars placed horizontally and vertically

STEP 2 The window and door frames are merely set in place within the framework of the wall. In this type construction, wall or panel forms are built in 1/3d time required in conventional construction

STEP 3 Concrete is poured into framework of wall. Prior to this, however, the floor of the building is coated with a chemical solution which prevents newly poured concrete from adhering to concrete floor

Pre-Cast Wall Cuts Industrial

A SUBSTANTIAL SAVINGS in time and money, plus an improvement in structural quality can be achieved in the construction of industrial plants through the use of a new building technique described as Tilt-Up or pre-cast.

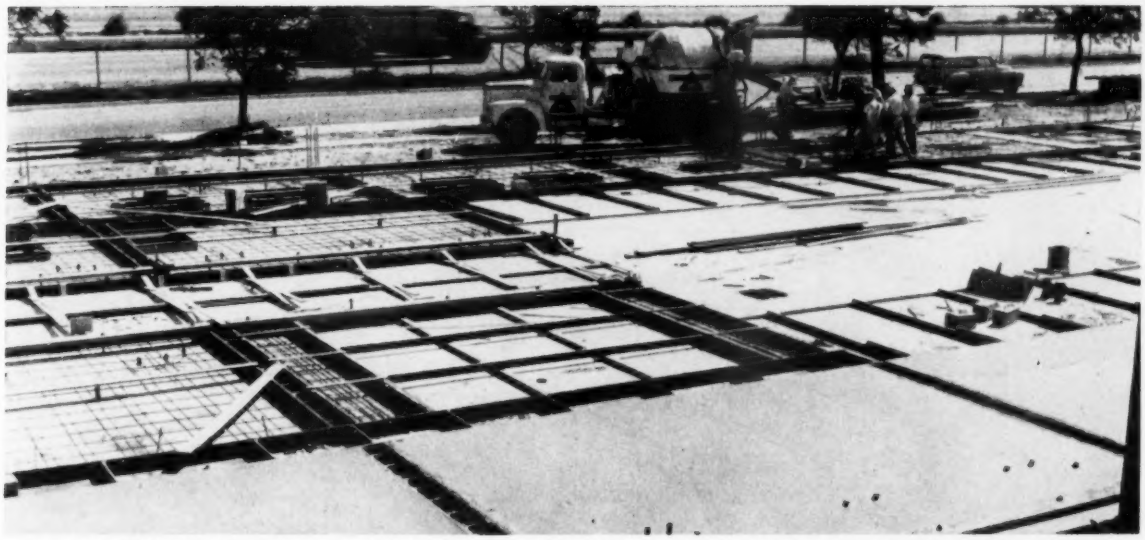
Economy is actually the greatest asset of this type of construction and one important reason for the sudden increase in its growth during the past 6 years.

The Western region of the country, particularly the Pacific Coast, is reportedly the birthplace of pre-cast construction in the United States and it still leads other areas of the country in total value of this type of construction, with $22 million done last year alone.

This new construction method has also been used extensively in South Dakota, North Carolina, Georgia, Texas and Washington, D. C.; and is rapidly spreading to other parts of the country.

Actually, the name Tilt-Up is a misnomer, since very few walls are actually "tilted." Instead, they are lifted clear of the casting platform and placed in the building frame. For this reason, many firms have chosen to call it pre-cast construction.

As an example of the economy involved in this type of construction, one contractor lists savings of 33,000 cu ft of cement, 160 tons of steel, 100,000 board-feet of lumber and 8 months of costly construction time



STEP 4 Walls are allowed to cure flat for a period of 10 days. Repeated tests have proved that this results in a better quality of concrete that is stronger, smoother, less porous and less susceptible to shrinkage cracks

Construction Building Costs

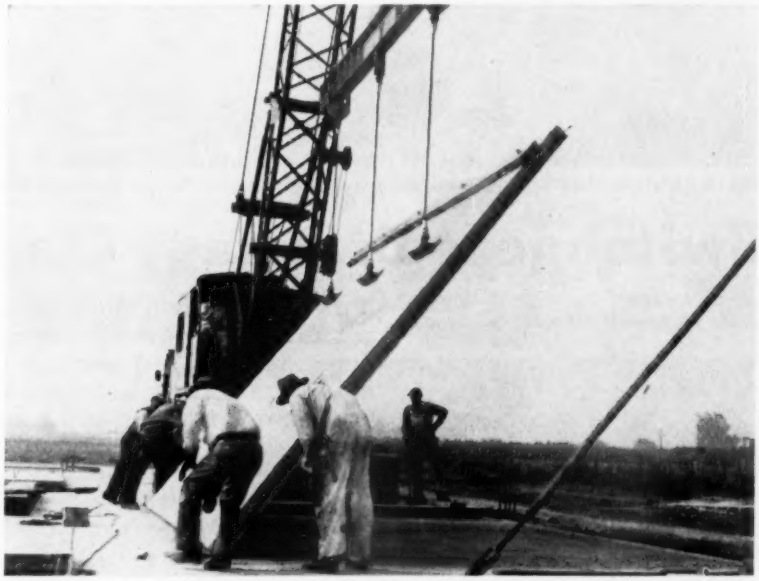
on one job alone. Totaled, these savings add up to approximately $1 million or about 22 per cent of what the building would have cost if conventional methods had been employed.

Another reason for the popularity of pre-cast construction throughout the country is that it actually results in a better job. By allowing wall panels to dry for approximately 10 days—as is the case in pre-cast construction—a less porous, stronger and smoother quality of concrete is achieved.

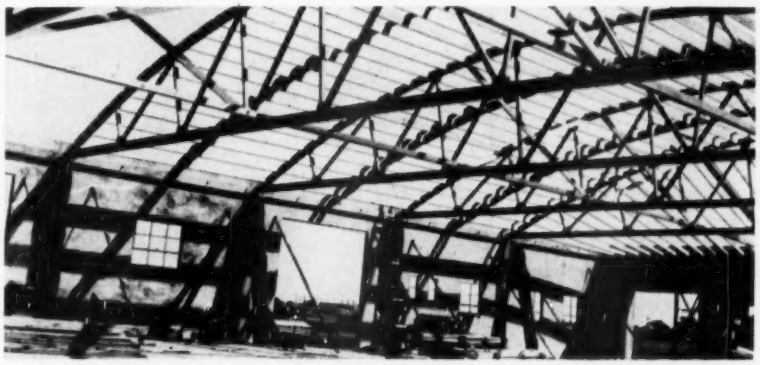
Pre-cast buildings have the economy of plant-made structures without the overhead. It would be awkward and completely impractical to prefabricate large and heavy concrete wall sections in a plant and transport them to the construction site. So the production equipment has moved to the site.

This construction permits a wide range of architectural designs with little or no increase in cost. A wall cast in the horizontal position can be given any one of the many surface treatments possible with concrete. It is easy to place a native stone or other facing in the fresh concrete of such a wall before lifting. Various color effects may be attained through the use of mineral pigments.

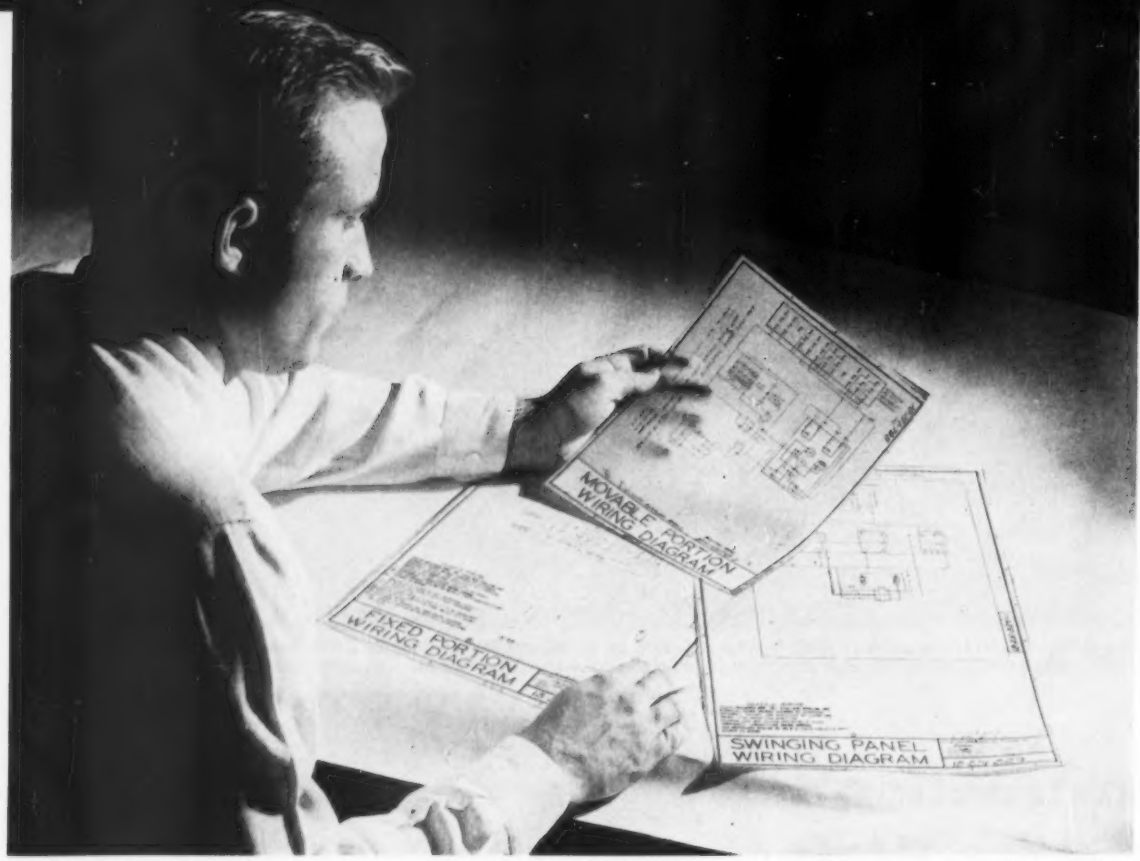
The pointing up that is often necessary when walls are cast in vertical forms is eliminated in the pre-cast wall construction.



STEP 5 When the walls have cured thoroughly, the forms are removed and the wall is ready to be raised. After raising the panels, structural columns are rapidly formed and concrete poured between panels



STEP 6 The roof framework of a pre-cast concrete building. The mill type trusses support the built-up composition roof and provide maximum fire protection. This construction offers savings in time and money

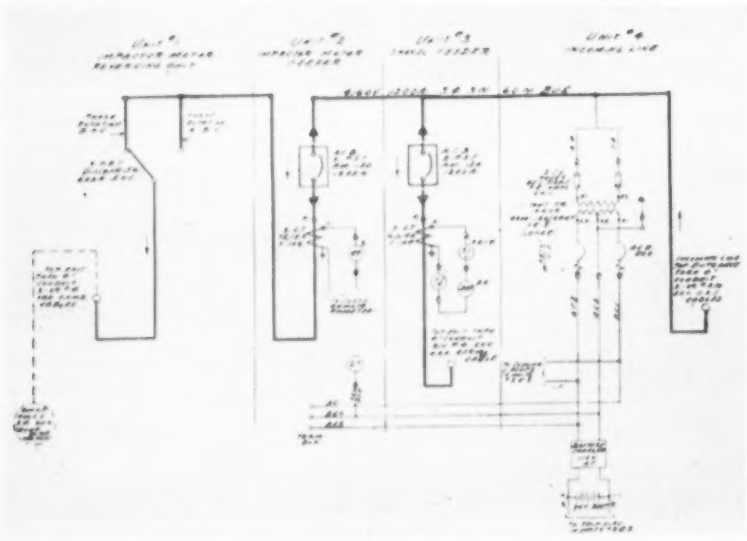


Movable portion, fixed portion, swinging panel diagrams are detailed drawings for specific portions of switchgear sections

Switchgear Drawings Clarified

If they are thrown into a pile switchgear drawings can be confusing . . . However, if you look at them as the author does, in logical sequence, and with the realization of what the manufacturer is trying to tell you, it's easier to find specific information on your switchgear installation

By R. STOWE, Switchgear Section, Allis-Chalmers Mfg. Co.



This diagram indicates circuits and devices contained in group of switchgear

IN THE PAST, drawings that show the many devices and numerous electrical connections of a switchgear group have often been complex and difficult to use. Through the years, however, a systemized series of drawings has been developed to facilitate a clearer conception of the equipment.

Each drawing in this series has a definite and singular purpose. In addition, these drawings complement each other to give a complete, yet easily understandable picture of any switchgear installation. By understanding the function of each drawing, a clear visualization of the equipment can be obtained even before it is manufactured.

Usually there are ten types of drawings in this systemized series. These are divided into two groups. One group relates to the physical installation, the other to the electrical functions and circuits.

Not all of the switchgear drawings for a specific job can be made up at one time. Rather, drawings are evolved through a series of checks to make sure that the finished switchgear will provide exactly the functions that are required.

During preliminary stages, specifications are prepared and a single line sketch is made indicating required electrical devices and functions. From this sketch and the specifications, the Single Line Diagram, Fig. 1, is prepared. It gives a general outline of all the equipment furnished in a group of switchgear units and indicates electrical connections of the principal switchgear components. However, it does not indicate physical location of these devices.

Information contained on the Single Line Diagram includes: ratings of circuit breakers, switches, potential and current transformers; types and functions of relays; connections of instruments and meters; ratings of resistors and reactors; size and number of primary cables, etc.

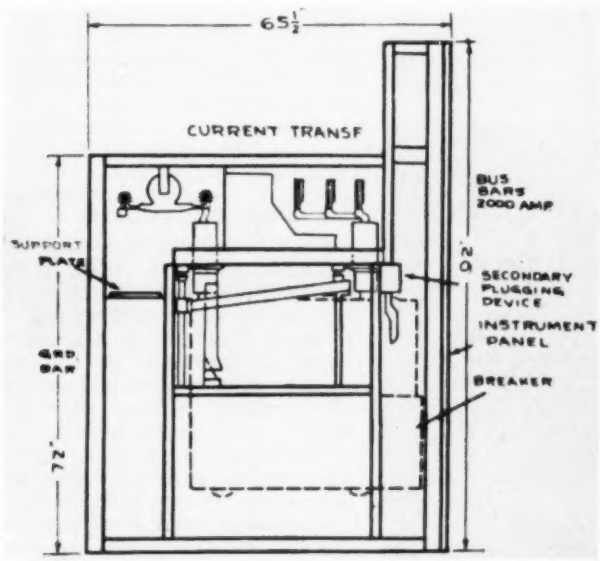
General arrangement and floor plan drawings give over-all size plus such details of the switchgear as channel mounting, cable entrances, shape, and so forth

Size and Shape Depicted

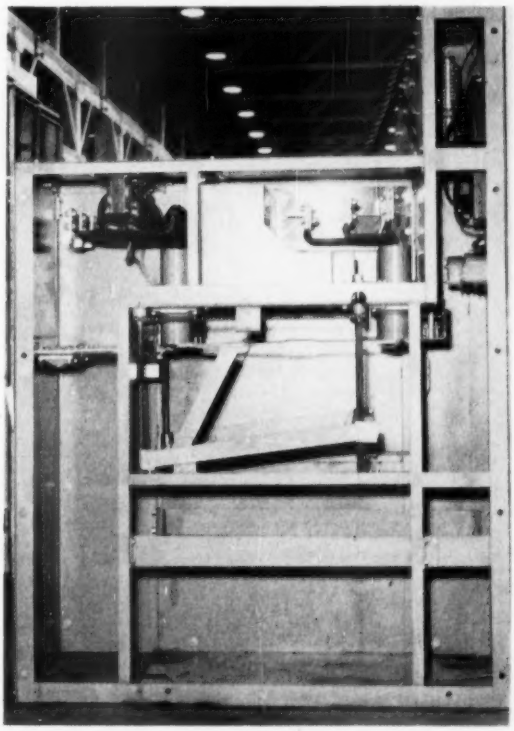
The General Arrangement and Floor Plan diagram indicates the physical size and shape of the switchgear group. Besides showing the over-all dimensions, location and size of primary and secondary wiring openings and data for preparing the floor is given. The sill channel mounting drawing, furnished in conjunction with the general arrangement drawing, includes a cross section view showing the preferred method of installing the mounting channels in the floor. Correct location of sills and floor openings assures easy installation when the switchgear arrives at the site.

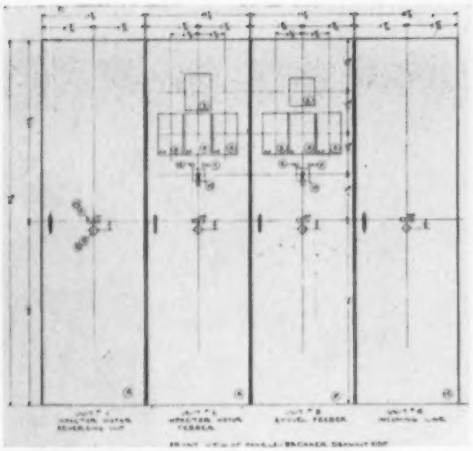
Side Views

So that the exact location of major equipment items within the switchgear units can be ascertained, a separate side view drawing for each

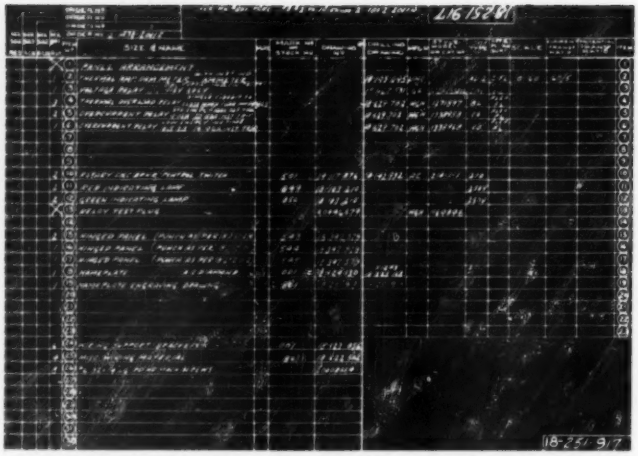


Side view drawings give a photographic concept of the location of major equipment items within each switchgear unit as illustrated by these companion views of the same unit





Panel arrangement gives front view of all panels in the group. Each panel-mounted item is located by dimension and is designated by a number



The bill of materials has a column of circled numbers corresponding to circled numbers on the panel arrangement drawing. All items are designated as to size, style, and other pertinent physical data

unit is made. Where the major features of several units in a group are duplicated, the same side view applies to all. Side views, general arrangement, floor plan, and sill channel drawings all relate to the physical structure and should all be at hand when checking or discussing a switchgear group. Together, these drawings contain all information necessary to prepare the installation site.

Panel Arrangement

The panel arrangement drawing gives exact location of all items on the switchgear panels. The exact dimensioned locations of all equipment mounted on every panel is designated by a circled number which corresponds with the same item on the bill of material. The bill of materials, sometimes shown on the panel arrangement and sometimes on a separate drawing, gives a detailed description of all these items.

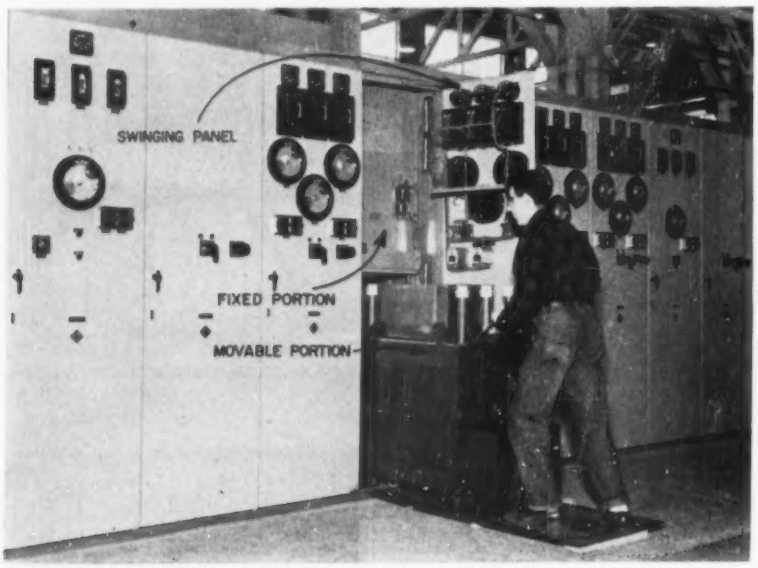
Where several panels in a group are identical, only one is completely dimensioned, the others simply carry a note stating that they are the same as the ones fully shown. This drawing is usually checked before manufacture begins to make sure that panel mounted devices are in the best possible position for convenient operation.

Simplify Connections

Several of the drawings are wiring diagrams. They give a complete picture of the electrical aspect of the switchgear group and are guides to correct electrical installation. First in importance is the master wiring diagram. It shows all of the wiring inter-connections between units, the connections necessary between groups if the gear was divided to facilitate shipping, and it shows external secondary connections.

Master Wiring Diagram

The master wiring diagram also tabulates the drawing numbers of all section diagrams, identifying them as to their proper unit and section number. These section diagrams, which should be at hand to get a complete picture, include: movable portion, swinging panel, and fixed portion wiring diagrams. Where terminal blocks, fuse blocks, knife switches and other devices are shown on both the master wiring diagram and fixed portion diagram, they are properly identified to point out these duplications.



Switchgear group with the panel of one unit open and the movable portion withdrawn to show portion covered by wiring diagrams shown in the first photo

Fixed Portion Diagram

Fixed portion wiring diagrams show the complete wiring within each individual switchgear unit, except for the wiring on the panel. A separate fixed portion diagram is made for each unit in a group. Where two or more units have duplicate wiring, the same diagram is used for all such units. Because most of the devices are mounted on the panel, the fixed portion diagram indicates only such items as connections between fuses, knife switches, current transformers, terminal blocks, and plugging device for the movable portion.

Swinging Panel Diagram

Connections to the terminal blocks of all devices mounted on the panel are shown on the swinging panel

wiring diagram, Fig. 5. Complete wiring diagrams for each individual panel makes it possible to wire each panel separately and completely before mounting it in the unit. The arrangement of equipment on the panel wiring diagram corresponds as nearly as possible to the position on the panel arrangement as viewed from the rear of the panel.

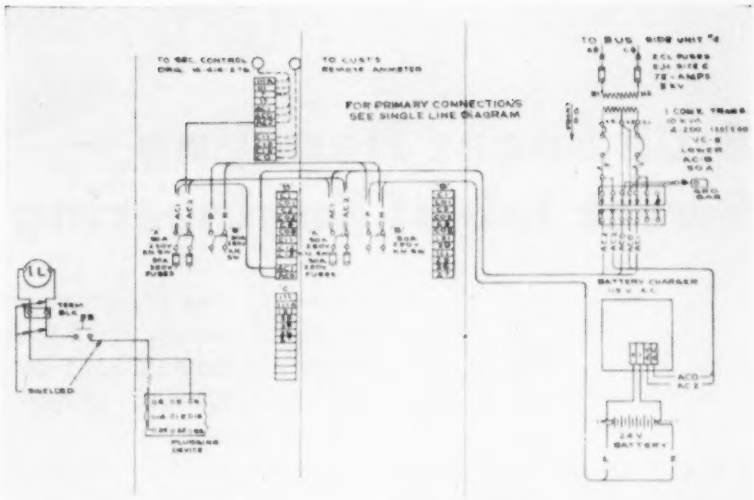
The movable portion wiring diagram shows connections to the secondary plugging device of all the equipment mounted on the movable portion. This includes control relay, number and type of auxiliary switches, trip coil, closing coil, etc. Like the panels, each movable portion may be completely wired by using its individual diagram. When movable portions in a group of switchgear are identical, the same diagram is used for all.

Control Schematic

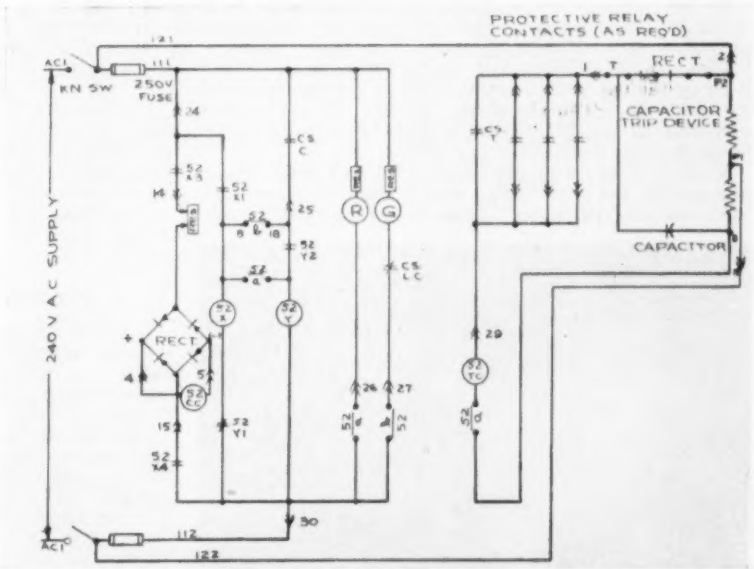
If, for some reason, it is necessary to trace the circuit breaker control circuit, the circuit breaker control schematic diagram simplifies the procedure. On this drawing, all electrical devices are shown according to their functions. Without jumping from one drawing to another, the electrical function of every part of the control circuit can be determined.

The devices indicated by symbols on the schematic diagram are actually mounted in several different places are shown in detail on the various section diagrams. For example, control switch and colored lights with resistors are mounted on the panel; the knife switch, fuses, rectifier and resistor, are in the fixed portion; while the closing coil, trip coil, capacitor trip device, circuit control relays and auxiliary switches are in the movable portion. Combining all of these devices and connections on one drawing makes it very easy to see how the complete control scheme operates. All symbols shown are identified, and notes explain significant features of the control scheme. Each device carries the same symbol number on every drawing where it appears.

Through a clear conception of switchgear drawings, quicker installation of equipment is facilitated. Knowing the type of information contained on each drawing of the systemized series assures faster and more thorough inspections, better service from the equipment. More detailed information on the individual devices and component parts of the switchgear units is contained within instruction books that accompany the drawings and switchgear.



Master wiring diagram shows external wiring to the switchgear, wiring between the switchgear units. It also correlates the different detailed wiring diagrams



Circuit breaker control schematic diagram makes it easy to trace the circuit breaker control circuit. Devices located on this schematic according to function

"You and your Florida vacation!"

Bulk Sugar Handling— Sweet Job of Engineering

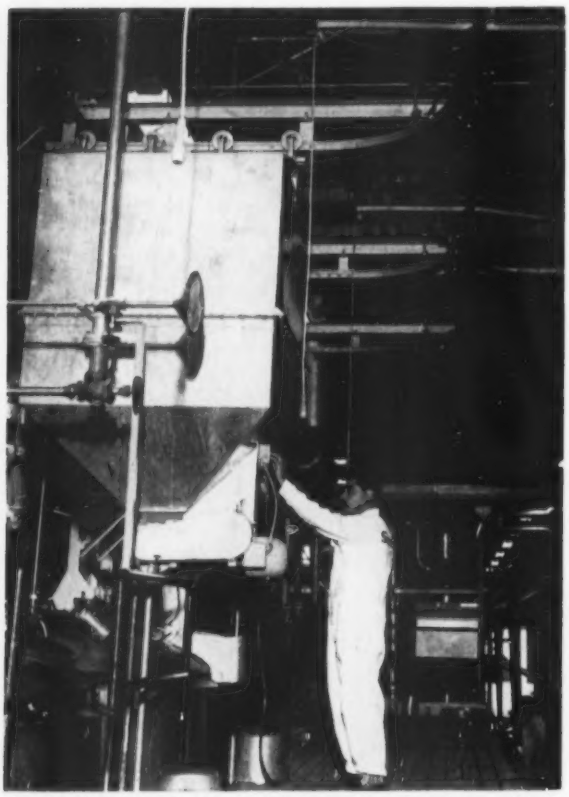
About 80 tons of sugar are handled daily . . . Hopper, monorail system, and 2 weigh larries, in addition to other plant equipment, help keep the sugar "on the move" . . . Circulating system prevents caking of sugar

LAST YEAR the Exchange Lemon Products Co., Corona, Calif., extracted some 3,300,000 gal of natural strength lemon juice, which it blended and processed into such products as frozen concentrate for lemonade.

In the process of producing more lemonade than thirsty children could consume on circus day, the company uses about 80 tons of sugar each day.

The company's bulk sugar facility, installed this year at its extraction-concentration plant at Corona, is one of the most efficient in the citrus industry. It is a system adaptable to any plant with a bulk ingredients (dry) problem.

A 12-ft square, maple-lined, 1600-bag bulk sugar storage bin and two 30-bag weigh-hoppers, suspended from monorail, as shown in sketch, are the heart of this sugar handling layout. Semi-trailer trucks loaded with 20 tons of granulated sugar unload from an inclined ramp directly in front of the storage bin.



Overhead monorail and switch spurs permit easy positioning of sugar larry over individual vats. Operator stands on catwalk, which is at convenient level to tops of tanks

Running from this ramp is a 12 in. diameter screw conveyor, 45 ft in length. The conveyor carries incoming sugar to an elevator of the loop boot type, which takes the sugar approximately 45 ft above ground-level to a point of gravity flow to both the bulk bin and to a 50 bag surge hopper located in the adjacent blending building.

Unloading sugar at the rate of 25 tons per hour, the conveyor carries the ingredients to the point of gravity where first, the house-tank (the surge hopper) is filled. This insures that the surge hopper, which supplies lemonade production, is always full even though the storage bin itself may be low. When the surge hopper is full, sugar is diverted automatically into the 1600-bag bulk bin.

Circulating System Prevents Caking

A closed circulating system, from the bulk bin, up the elevator and back into the bin by gravity, allows circulation of the bin's contents—a preventive against caking—should sugar not be withdrawn from it over any 24-hour period.

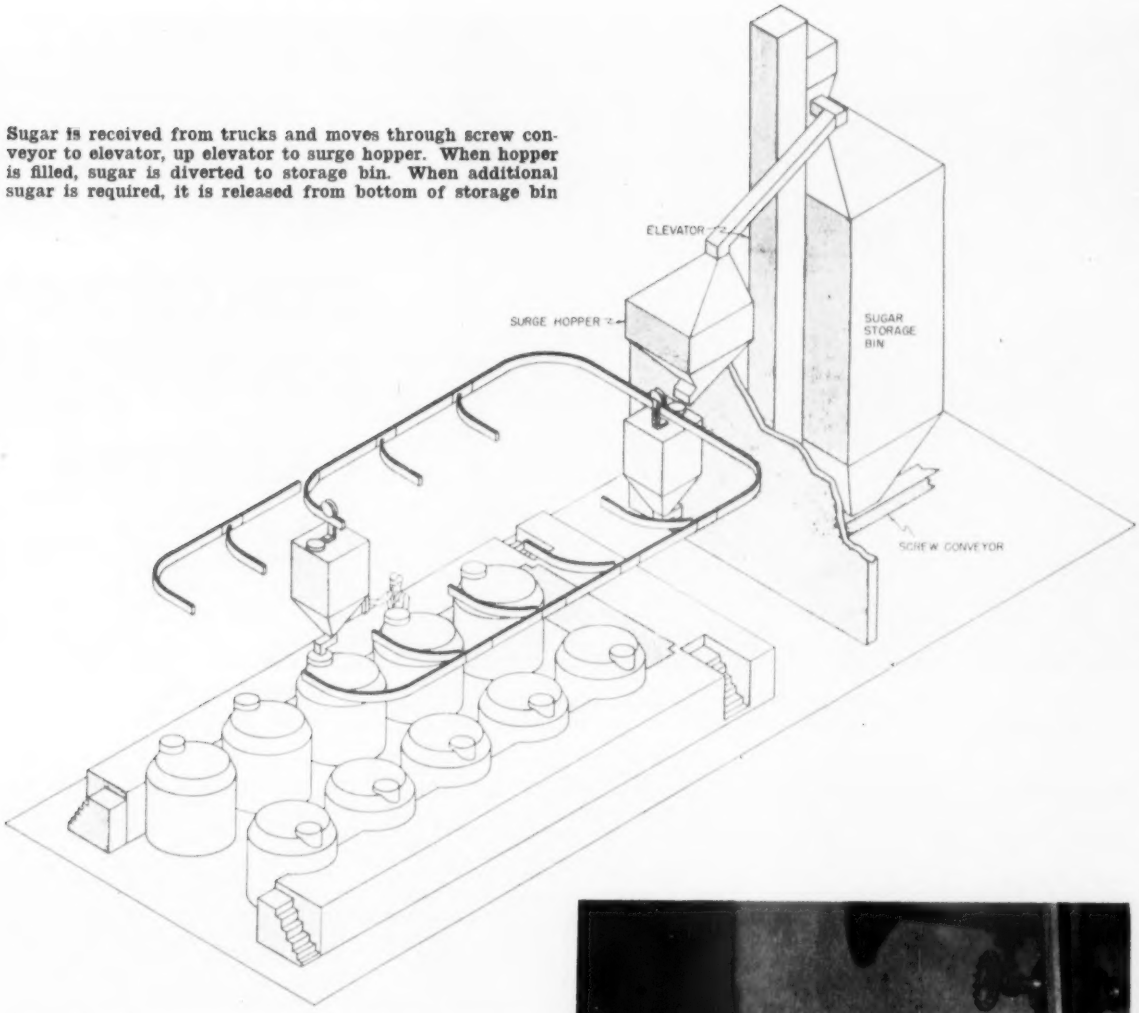
The big bin is equipped with 3 bin indicators. One, at the bin's top, tells operators when it is full and at the same time automatically shuts off the conveyor carrying incoming sugar. Another indicator, located about midway from the top, signals reordering time. And a third, at the bottom, indicates when the bin is nearly empty.

Inside the blending room and arranged in two rows are ten, 1000 gal, cold-wall stainless steel tanks in which juice is agitated under an 18-20 in. vacuum. A steel operating deck, supported by I-beams, connects these tanks with a weighing station directly beneath the surge hopper. Suspended over the operating deck is an 8 in. monorail upon which rides the two, 3000 lb capacity sugar larries. Spur monorails, with switch cords hanging down, allow larries to be positioned over individual tanks.

Larries are pushed along the monorail to a special 10 in. wide I-beam section under the surge hopper. This section of the monorail is connected to a self-recording scale. Sugar from the surge hopper flows by gravity at the rate of about 3000 lb a minute into the larries. When the correct weight has been reached, the scale automatically prints this delivered-sugar weight on a tape, and at the same time shuts off the flow from the surge hopper. Quantities are preset on the scale. After that, flow and shut-off are automatic, as is recording.

The larry is then pushed to one of the juice tanks. The power feed line of the ¾ hp motor, built into each larry, is plugged into a nearby outlet. This larry motor powers a small, short-run screw feeder which empties the larry at the rate of about 3000 lb per 45 minutes—

Sugar is received from trucks and moves through screw conveyor to elevator, up elevator to surge hopper. When hopper is filled, sugar is diverted to storage bin. When additional sugar is required, it is released from bottom of storage bin



assuring that the sugar mixes well with the citrus juice as the vat is agitated by a motor-driven agitator.

The company's sugar handling and distribution system works so satisfactorily that only 2 operators are needed in the blending process which will produce more than 3,000,000 cases of frozen and shelf-pack lemonade this year.

Incidentally, larries weigh but 825 lb empty. Yet, even when fully loaded with a gross of some 3,800 lbs, they can easily be positioned along the monorail by one man.

Operators Work on Off-the-floor Platform

Batching and sugar handling, once a tedious job, has been so streamlined by the monorail system and by operators working from the raised, off-the-floor platform, which is at a convenient level to the tops of the tanks, that the entire blending operation requires but 1000 sq ft. The U-shaped operational deck is raised 5 ft 6 in. above the processing floor; the monorail is hung 16 ft 7 in. above the floor; and the bottom-feeding portion of the larries just clears the tops of the tanks, being about 3 ft above the platform.

Flexibility that has been designed into the system is as follows: (1) Sugar can be conveyed directly from incoming supply trucks to the surge hopper for immediate use—in case the main storage bin is running low; (2) Sugar can be withdrawn from the storage bin, and elevated to the surge hopper; and (3) Sugar can be circulated throughout the system to prevent caking if unused for any length of time.

Each sugar larry is equipped with a ¾ hp motor, powered by a small screw feeder which empties contents of larry into juice tanks at the rate of 3000 lb in 45 minutes

Parts to be painted are simply dumped into the tumbler—No time-consuming setup is required. This is the smallest tumbler at Bonhop plant

HOW TUMBLING CUTS PAINTING COST

By HENRY G. SCHAUB
Plant Manager
Paul Bonhop, Inc.

BY REPLACING SPRAY painting with "tumble-painting," Paul Bonhop, Inc., Bronx, N. Y., manufacturers of quality wooden toys, cuts painting costs as much as 81 per cent. Formerly, all parts were sprayed. Now components up to 3 in. by 6 in. are tumble-painted as shown in Figs. 1 and 2.

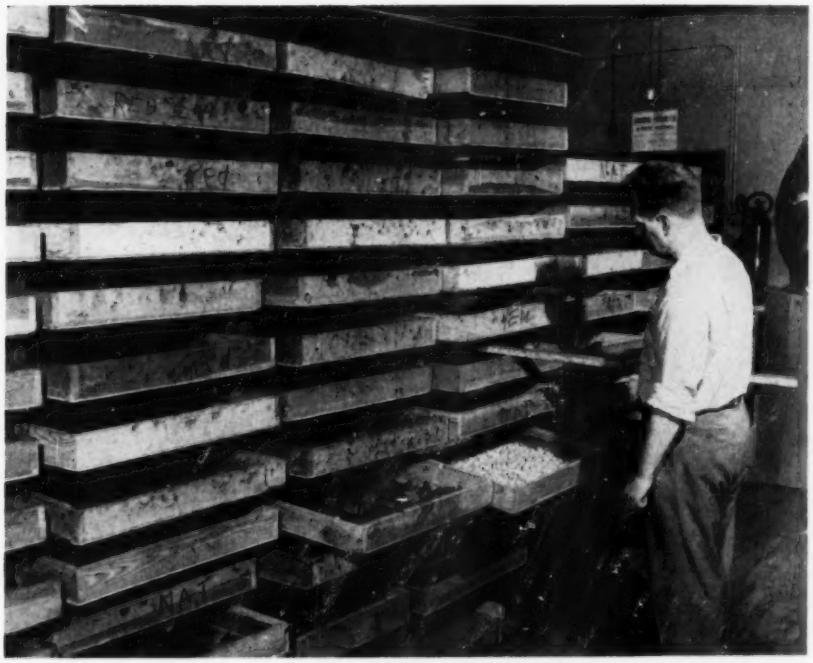
Six tumblers, manufactured for the purpose by Tumb-L-Matic, Inc., New York, are used in the Bonhop paint shop. Five are for tumbling miscellaneous parts; the sixth, a smaller tumbler, is specially constructed for paint-tumbling dowels. The tumblers are octagonal in shape and rotate on horizontal axes. Each of the five large ones is partitioned into two sections or compartments so that two individual operations can be carried on at the same time in the same tumbler.

Parts to be paint-tumbled are emptied from a lipped box-container into the tumbler as shown in Fig. 1. The tumbler section is filled approximately half full with work to be tumbled, and lacquer or varnish is added.

The amount of lacquer or varnish required for a batch can be judged only by experience and varies with the size of the part, the type of material, and the lacquer or varnish. The example given later in the article indicates requirements for one particular job.

Each tumbler compartment is

Tumblers are divided into two sections to permit two operations at once. Tumblers are unloaded into trays as shown



Parts dry on storage racks. Lacquered parts dry in two hours; varnished parts dry over night. Varnished parts are jiggled after storing to prevent sticking

equipped with two covers—a solid cover and a screen cover. The solid cover is used for the first one or two minutes of tumbling to prevent paint from spilling out. Then this cover is removed and the screen cover installed. By this time the paint has been dispersed to the parts and won't spill out. The screen cover permits solvent vapors to escape and allows air to enter during tumbling. Lacquer coats require tumbling for approximately ten minutes. Varnish coats require but two minutes.

Parts are emptied from the tumblers into trays as shown in Fig. 2. The trays are then shelved for drying as shown in Fig. 3. Lacquer drys in approximately two hours. Varnish is allowed to dry over night. Shortly after varnished parts are shelved, the screen-bottom of the tray is jiggled as shown in Fig. 3 to dislodge any parts which might have adhered to one another.

The varnish and lacquer used in this tumbling process was specially prepared by the Hofford Varnish Co., Carlstadt, N. J. When varnish tumbling larger parts, one-inch diameter wood discs, called "carriers," are tumbled with the parts to keep them separated during the tumbling process.

A typical cost comparison between the old method and the new method is as follows. In this example 1,000 pieces, ¾ in. by 1¾ in. by 3½ in., receive two coats. The wood is kiln-dried birch, beech or maple.

Comparing the old method with the new, $8.23, or 81 per cent, is saved per thousand pieces.

Finishes used at Bonhop are clear, yellow, blue, and green. Each tumbler section is used for applying only one color. The method described is referred to as the lacquer-and-varnish method, the coats being applied by tumbling. This method is the least expensive known to the company and produces a finish comparable to or better than other methods.

Other Methods Used

Other methods used in this country include the multi-coat enamel method and the lacquer-and-wax method. The enamel method has the disadvantage that the enamel coats, no matter how applied, must be allowed to dry for 24 hours or baked for two hours. The lacquer-and-wax finish does not provide as lasting a finish as the methods where two coats of paint are applied. Wax, incidentally, can be applied with the tumbling method simply by grating carnauba wax and adding it to the tumbling barrel after the first coat of lacquer.

Table I. Tabulation of total labor and material costs for old painting method

Labor Cost			
First Coat—Time in Minutes			
Set up time	40		
Spraying time	40		
Turning, spraying	60		
Total	140	140	
Second Coat			
Spraying time	40		
Turning, spraying	60		
Total	100	100	
Total time		240	
Total labor cost			
240 min. @ $1.20/hr			$4.80
Paint Cost			
First Coat (lacquer)			
Lacquer ¾ gal @$2.50	1.88		
Thinner ¾ gal @ $1.10	$0.82		
Total	$2.70	$2.70	
Second coat (lacquer)			
Same as first coat	$2.70	$2.70	
Total paint cost		$5.40	$ 5.40
Total cost per 1,000 pieces			**$10.20**

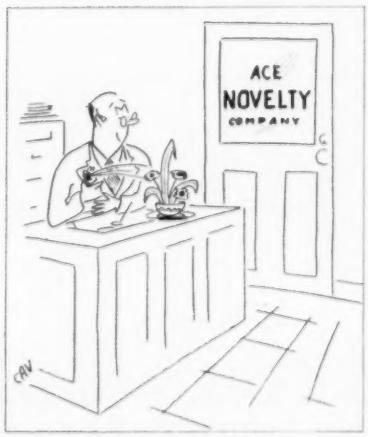


Table II. Tabulation of total labor and material costs for new painting method

Labor Cost			
First Coat—Time in Minutes			
Loading and unloading tumblers	12		
Second Coat			
Loading, unloading tumblers, removing carriers from work pieces	24		
Total time required	36		
Total labor cost			
36 min @ $1.20/ hr			$0.72
Paint Cost			
First Coat (tumbling lacquer)			
Lacquer 3/16 gal @ $3.52	$0.66		
Thinner 5/16 gal @ $1.10	$0.35		
Total	$1.01	$1.01	
Second Coat (tumbling varnish)			
Varnish 1/16 gal @ $0.52	$0.22		
Benzine 1/16 gal @ $0.15	$0.02		
Total	$0.24	$0.24	
Total paint cost		$1.25	$1.25
Total cost per 1,000 pieces			**$1.97**

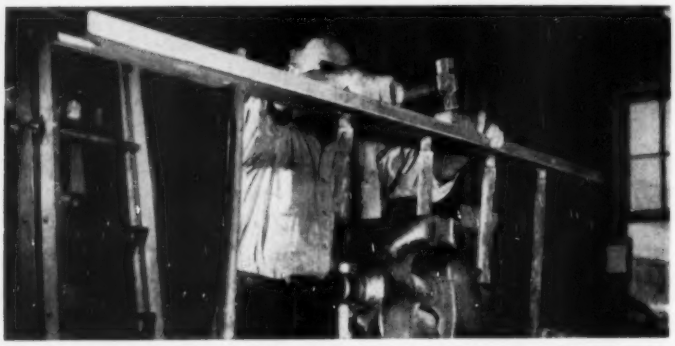
After being repaired, ladder is dipped into tank of water repellent preservative

Atlantic Refining's Ladder Center Insures Safety

Centrally located repair shop built for ladders . . . Scheduled inspections maintain safety . . . Ladder dispatcher keeps 3,000 ladder units on file and on call

Next inspection due date is stenciled on ladder

Supervisor team inspects scaffolding erected on a large refinery stack



Leg being installed on a sectional ladder unit in shop for minor repairs

IN THE INTEREST OF SAFETY and to insure the proper maintenance and care of ladders and other related equipment, the Atlantic Refining Company has instituted a ladder center which is geographically located in the center of the Point Breeze Refinery.

This Center is responsible for not only the purchase of new ladders, but also the inspection, repair and distribution of all ladders used in the plant and at the main office building in Philadelphia.

When new ladders are received, they are inspected thoroughly and then dipped in a trough containing a solution of water repellent for the preservation of the wood. The preservative is allowed to drain and dry, and the ladder then receives two coats of outside spar varnish. No ladder is ever painted with an oil paint.

A number is stenciled on the inside of the side rail together with a date indicating when the ladder is to be re-inspected. It is then equipped with 10 ft of $\frac{3}{8}$ in. hemp rope that is attached to the top rung for fastening the ladder when in use. After safety shoes are attached to the bottom of the ladder, it is placed in storage, ready for issuance.

When ladders are needed for a job, an order is issued by the foreman and sent to the Ladder Center. They are then delivered to the job by a specially designed truck. After the job is completed, the Ladder Center is notified to pick up the ladders. On their return to the Center they are inspected; necessary repairs are made, and they are again placed in storage to await checking out for use.

If a ladder is damaged on the job, it is reported to the Center. Arrangements are then made to pick it up and replace it with another so that no loss of time need result.

Some ladders are assigned to various departments permanently, but even these are inspected every 6 months at their locations and replaced where necessary.

After each inspection, the date stenciled on the side rail is advanced 6 months to indicate to the user that this ladder should not be used beyond that date.

Inspection reports are made and returned to the Center where a record of each ladder is kept. If a ladder cannot be located on inspection day, a special form letter is sent to the department asking them to advise the Center where it can be found so that inspection can be made.

In addition to the above inspection routine, a regulation has been issued to all departments outlining the care and use of ladders on the job. Some of these specifications are as follows:

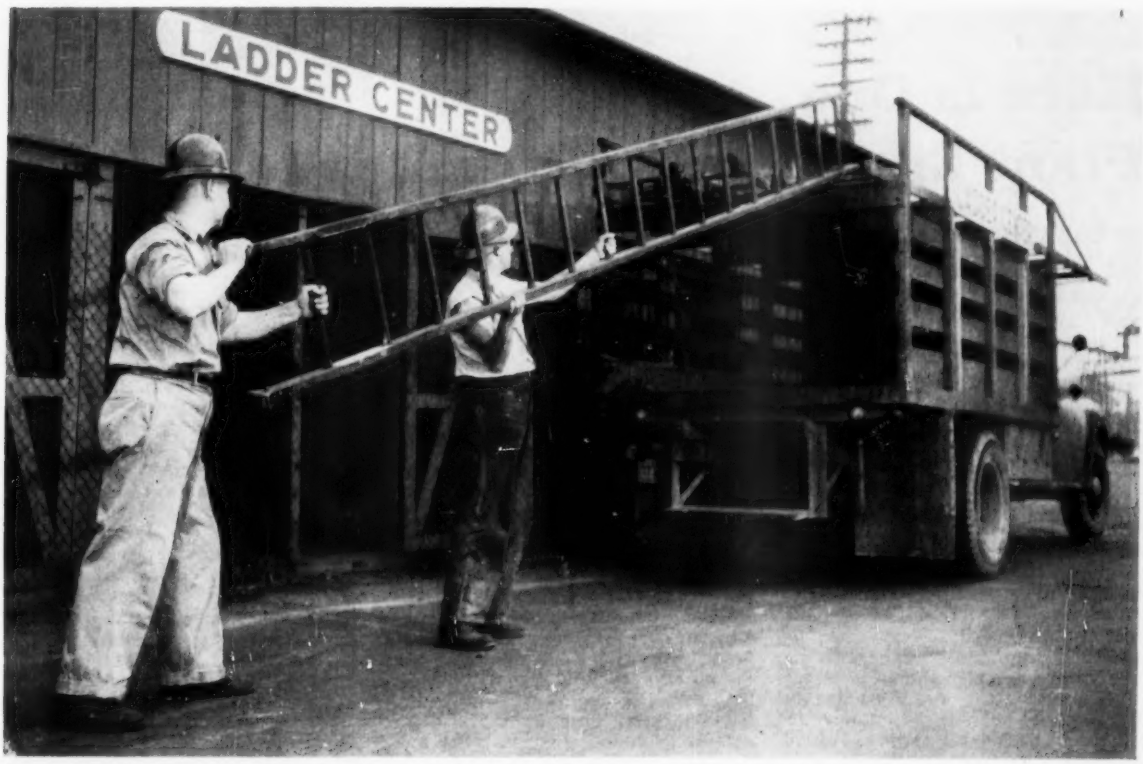
1. No employee, other than the Ladder Inspector, is permitted to separate the parts of an extension ladder.
2. When section ladders are used and the height is such that it requires more than one section, the ladders must be installed vertically and securely fastened to the scaffold or platform.
3. When ordering a ladder from the Center, be sure to order the proper size ladder for the job in question.
4. Nothing shall be nailed to the ladder.

In addition to ladders, the Ladder Center also handles all tubular scaffold used in the plant. This equipment is inspected each time it is returned to the Center.

At the present time, there are over 3,000 ladder units and more than 33,000 ft of various lengths of tubular scaffold in stock.

All ladders are stored flat on racks in a storage shed whose side walls are made of wire. This open construction allows a circulation of air, yet still protects the ladders from the weather.

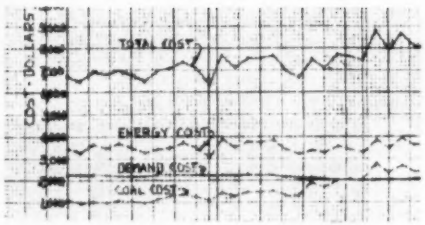
Since the innovation of the Ladder Center, accidents due to ladder failure have been practically eliminated. The Ladder Center has made a large contribution to plant safety at Atlantic Refining.



A refurbished, inspected and dated ladder is loaded on the specially constructed truck for delivery to a job or department

From left to right: the chief draftsman, industrial engineer, Plant Engineer Tucker, and mechanical engineer, inspect template arrangement of building

Plant engineering organizations in the great southern textile mills operate in much the same way as any industrial plant in the north . . . Here are examples of jobs done by the author's engineering organization



Here Is One Plant Engineering Organization

By ROBERT J. TUCKER, JR., Plant Engineer, Roanoke & Patterson Mills Companies

WHAT IS THE MELTING pot for headaches — the happy hunting grounds for old tossed-around ideas and problems in American Industry? In our mills, it would be the plant engineer's office, his files, the piles of papers on his desk, and the notes he has made.

Twelve years ago, the writer was employed by three cotton textile mills as the plant engineer. My instructions were to "find out what an engineer could do in the mills." Management and I shared the conviction that the right engineer could do much. We were at a complete loss, however, as to just what he could do or should do. The ensuing years have revealed the scope of his work most clearly in our own mills. Parallel developments in other industries have raised plant engineers to the professional status in industry that they now enjoy.

What is this relatively new department that has grown so rapidly into prominence? We define the Plant Engineering Department as a small group of men who, by virtue of special technical training and a sincere dedication to purpose, are capable of recognizing or gathering together from others the many problems, headaches, and ideas to be found in our industry; with the end result of formulating solutions or suggestions that will result in more production and increased profits.

Please note we do not have any experts or geniuses in our department. We emphasize flexible open minds ever looking for new ideas. The ability to find the answers when needed rather than to carry them around in the mind is especially important.

Management now expects many definite functions from our department so we have had to learn the management point of view in addition to our own engineering fields.

Our staff consists of four men—an electrical engineer, industrial engineer, mechanical engineer, and a chief draftsman. We are fully equipped with ample office space and equipment including stenographic assistance as needed and blueprinting machinery for reproduction of prints and other materials.

The scope of our work covers three cotton textile mills located about a mile apart in this city. Of course, daily routine maintenance to keep production flowing is the primary problem. The key to this function is an able and alert master mechanic at each mill. Under his supervision come the mechanics, electricians, welders, pipefitters, machinists, and other trades needed

for this routine maintenance work.

He operates the machine shop, welding shop, boiler room, and compressor rooms. Every possible maintenance and repair function is decentralized to this man. Paper work is reduced to the minimum necessary for the purchase of maintenance supplies and materials, payroll, and personnel data, and vital repair records and information.

Each master mechanic supervises and operates his own field of responsibility. Under no conditions do we consider that he *must* report to us as his superiors. On the contrary, we concentrate on helping him to develop his own skills and abilities to the greatest degree possible. The merits of his work and value of his ideas are always evident to those with whom he works—never clouded or half claimed by such statements as "Approved by the Plant Engineer." If the quality of our technical assistance is maintained on the proper level, the master mechanic will willingly bring to us the matters we should handle directly.

Time-consuming problems are tackled within the engineering department to avoid delays in routine daily maintenance. For instance, the preparations of detailed drawings and estimates of materials for new machinery installations receive our special attention. These plans are never considered complete, however, until they have received full study and suggestions from those directly involved in the mill.

The best ideas for improvements usually come from those most closely associated with the daily problem. We seek their advice constantly. Completed plans are followed by estimates of costs and anticipated savings. In the case of complicated plans involving the interchange of machinery between mills or the introduction of new textile products, the estimates of savings and anticipated production costs are prepared by the cost accounting and time study department. Our plans are never considered final. Practical suggestions for improvements are always welcomed and employed if possible.

A free use of templates and occasionally models is made to arrive at preliminary machinery layouts. These are discussed and corrected at length by the manufacturing supervisors involved before reaching the drawing board. We are gradually evolving a system of transparent master building prints on which machinery templates can be placed and whiteprints made immediately, thus bypassing the usual drawing board stage. This will permit preparation of several alternate layout plans within a matter of hours.

In addition to layouts, we prepare the electrical, heating, piping, and miscellaneous plans associated with them. There are, of course, many minor projects for modernization or improvements of machinery, automatic electrical controls, additions to mill electrical systems, design of special trucks and attachments for handling materials, improvements to boilers and air compressors, and many others. We design small building additions.

Construction is done by a construction and maintenance department which also performs all major building repairs. We supervise from an engineering viewpoint the insurance covering equipment such as boilers, compressors, and large electric motors.

When time permits, we assist local city organizations, such as the public schools, in the solution of their problems and in planning expanded facilities. We feel that this is a direct responsibility of industry in relatively small communities and that definite dividends are obtained by that industry which recognizes this fact.

We are constantly on the search for new ideas to be used in our plants. Trade magazines, group meetings, on-the-job observations, visits to other mills, discussions with sales representatives all add to the field of knowledge. Sometimes rank originality is required. We encourage it, and wherever possible, test out the ideas on the job before pushing its acceptance.

Training of maintenance personnel is a problem of scope and possibilities we are just really recognizing. New scientific developments gradually penetrate to every mill through modern machinery. Introduction of ball bearings, for instance, created the need for more skillful lubrication than the old oil can and wiperag method. Machinery with these bearings required more precise repair of parts in the machine shop to render satisfactory operations.

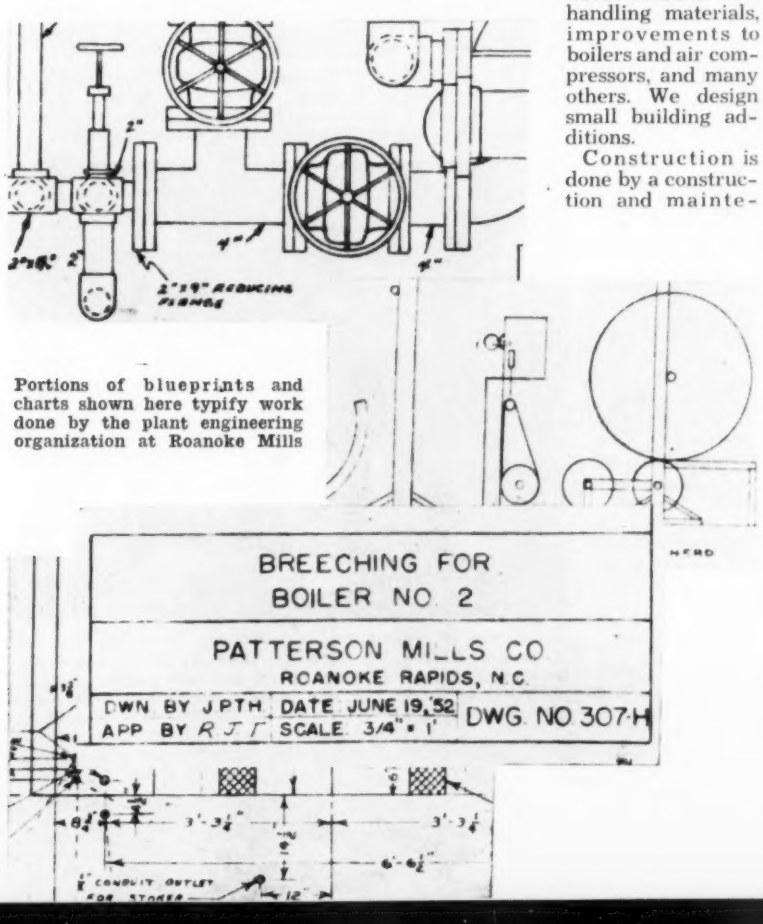
Electronics, air conditioning, and other automatic processes all require skills not often on hand. In some cases, a service contract with the equipment manufacturer is desirable. In others, special schooling of our mechanics by the manufacturer is more practical. This field will consume more and more of our time in the future.

Although the personnel department carries on a continuous safety program, we try to further it whereever possible. In new layouts for instance, adequate straight work aisles, good lighting, neat orderly machinery arrangement, location of electrical controls and started rods, and clearances from overhead piping, wiring, and monorails are all considered. Painted lines on the floors to mark aisles and storage areas are employed.

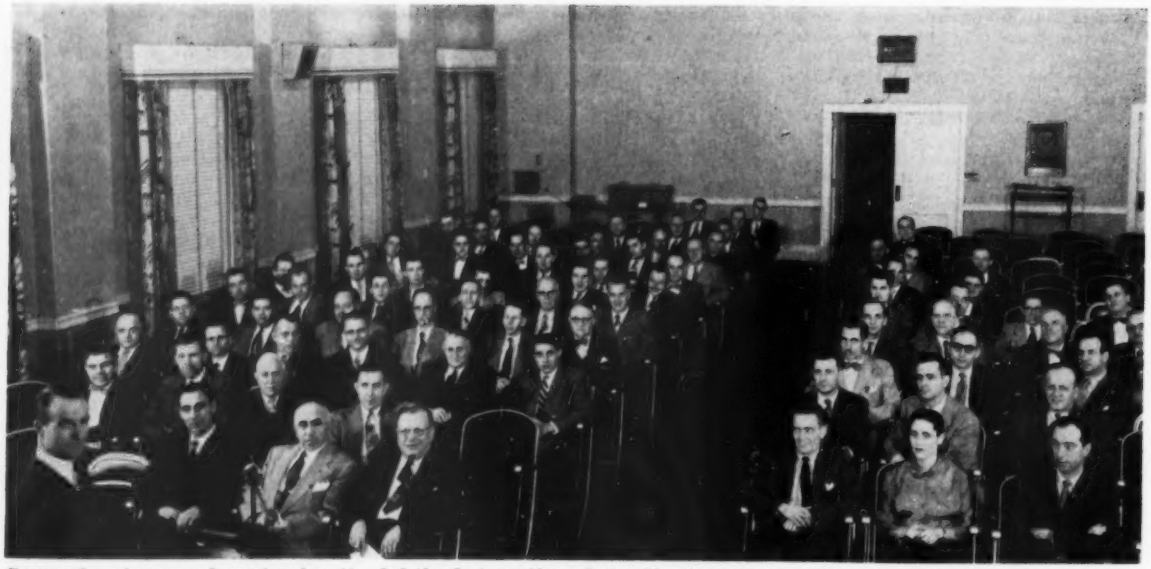
Competition and costs in the textile industry are making it more important daily for the engineer to understand the basic principles and economics of his business. His planning and suggestions will become more valuable and profit-making as this understanding grows. The new college courses now being established in Plant Engineering should emphasize this.

Engineers in industry without this knowledge should study through reading or correspondence courses. No doubt, courses in business prin-

(Contined on page 160)



Portions of blueprints and charts shown here typify work done by the plant engineering organization at Roanoke Mills



Group of engineers and guests who attended the first meeting of the Cleveland Plant and Production Engineering Division

Cleveland Plant Engineers Group Reactivates

ON NOVEMBER 21 a group of Cleveland engineers attended the first meeting of the reactivated Plant Engineers Division, of the Cleveland Engineering Society, under the new name of the Plant and Production Engineering Division.

Since the scope and responsibilities have so greatly expanded in recent years from the old conception of a plant engineer, the new title was thought to be more accurate.

The former Plant Engineers Division was inactive during the war and immediate post-war years. However, until its suspension during the war period the Plant Engineers Division had a long and active history. The formation of the Division dates back to 1928.

A small group of engineers met on September 4th at a luncheon meeting to discuss possible reactivation.

Under the leadership of David H. Samuelson, chief engineer of National Screw and Mfg. Co., the group selected the new name for the division and elected officers to formulate the division's aims and purposes and to plan a program of meetings.

Elected to head the new Plant and Production Engineering Divison were: President, David E. Johnson, vice president, Steel Improvement and Forge Co.; Vice Chairman, Roy N. Stevenson, chief engineer, building and maintenance; Recorder, A. L. Borgia, plant engineer, Weatherhead Co.

In taking the chairmanship, Johnson stated that he thought the new division opened up an area of interest to many engineers who, regardless of position, will want to participate in activities centering around plant and production engineering.

Next Meeting

The Division will meet again on January 12th. Colonel Richard H. Morris, Editorial Director, Plant Engineering magazine, will give a talk on the subject, "The Role of the Plant and Production Engineer in Modern Industrial Management."

Left to right: David E. Johnson, chairman, Plant and Production Engineering Division; Gerard Piel, speaker of the evening, Scientific American; and Harry Gellin, president, Cleveland Engineering Society, and president, The Gellin Co.

Other men instrumental in reactivating the group are, left to right: Donald P. Geck, Division publicity chairman; Richard Ward, Plant Engineering magazine; David Hessey, Scientific American; A. L. Borgia, Division recorder, and plant engineer, Weatherhead Co.; Rocky Marinello, Plant Engineering magazine; Roy L. Denison, Division committee man, and plant engineer, Fulton Foundry and Machine Co.

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For more facts circle 557 on Reply Card

Philadelphia Club Honors Plant Engineering

AT THE NOVEMBER 11 meeting of the Plant Engineers Club of Greater Philadelphia Richard H. Morris, Editorial Director of PLANT ENGINEERING magazine, was honored with a testimonial scroll in appreciation of his assistance and encouragement in connection with club activities. At the same meeting, R. M. Fuller, a consulting engineer of Philadelphia and seated fourth from the left in the group photograph, spoke on the registration of professional engineers.

Above: Richard H. Morris receives testimonial scroll (shown at right) presented by the club president and charter member, Robert F. McCaw. Bottom picture: Group of Philadelphia plant engineers present at testimonial dinner meeting

A

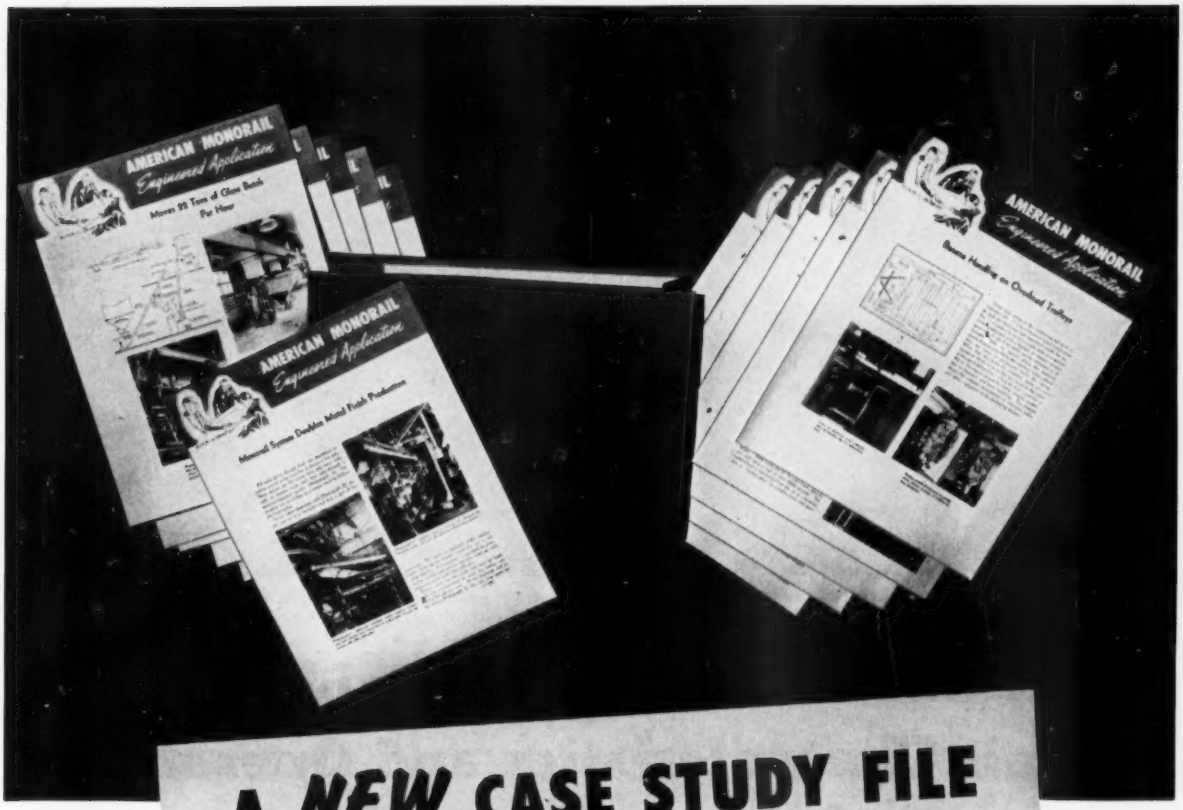
TESTIMONIAL

We, the members of the PLANT ENGINEERS' CLUB OF GREATER PHILADELPHIA, extend to

Richard H. Morris

Editor of PLANT ENGINEERING, our thanks and appreciation for his part in the founding of our CLUB. • Through his unselfish efforts, the Charter Members of the Club were brought together. And through the same source came help and guidance needed for the organization of a group intensely interested in common problems. • Therefore, we the members of this Club, do extend our sincere thanks to a man devoted to a great cause, one whom we admire and value as a friend.

PLANT ENGINEERS' CLUB of GREATER PHILADELPHIA



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Adjusting thermostatic expansion valve superheat control

Adjusting setting of combination control in motor circuit

REFRIGERATION CONTROLS —Their Characteristics and Operation

IN CONTROLLING the operation of automatic and non-automatic refrigeration systems, a number of basic types of controls are employed, and there are variations of most of the basic types.

The two main types of refrigeration controls are refrigerant (liquid and vapor) controls and motor controls.

The refrigerant control's include hand-operated expansion valves, low pressure float valves, high pressure float valves, automatic expansion valves, thermostatic expansion valves, solenoid valves, and thermostats.

The motor controls include high pressure cutouts, low pressure controls, low temperature controls, and oil pressure differential (protection) controls.

In addition, there are controls that provide hot gas evaporator defrosting, time-pressure defrosting, time defrosting, temperature or pressure rise alarms, and cooling water flow regulation.

The refrigerant controls are liquid refrigerant metering devices used to control the quantity of refrigerant entering the evaporator. Evaporator temperatures are controlled by other devices.

Where the quantity of liquid refrigerant maintained in the evaporator is approximately 25 to 50 per cent of its capacity, the system is termed a dry system; where 75 per cent or more, a flooded system.

The liquid refrigerant control in a refrigerating system is the dividing point between the high pressure side and the low pressure side of the system.

Hand-operated expansion valves are throttling valves (usually equipped with a needle shutoff) employed to control the flow of liquid refrigerant to the evaporator, especially in some ammonia refrigerating systems operating on a relatively constant load basis, such as in freezing ice.

Low pressure float valves control the level of liquid refrigerant in the evaporator. This is accomplished by means of a float located inside the evaporator, in an accumulator connected to the evaporator, or in a float chamber connected to the accumulator or evaporator, as shown in Fig. 1. A hand expansion valve is usually employed as a bypass around the float valve, for use in the event the float valve must be isolated for servicing.

On large systems, the refrigerant liquid level can be controlled more closely by operating with the hand expansion valve partially open. This minimizes boiling in the float chamber.

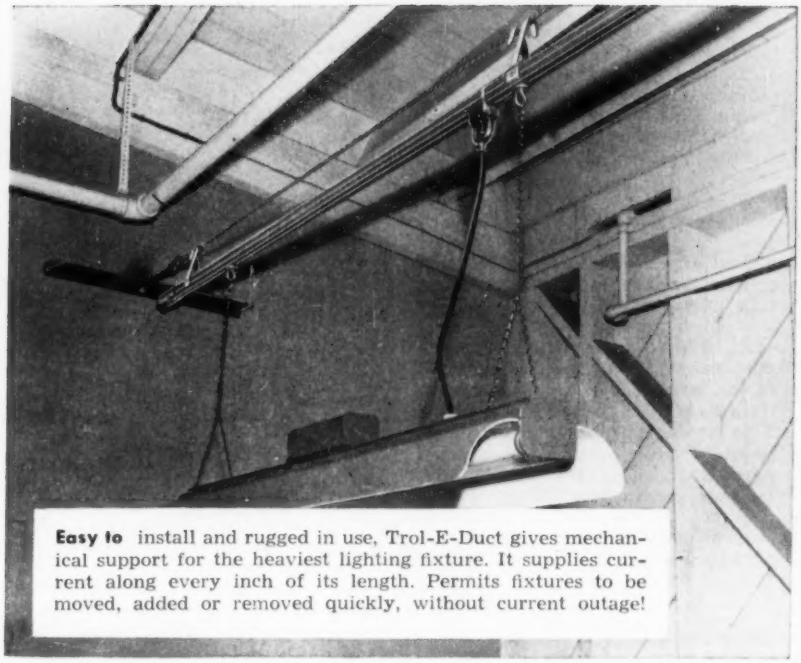
Where Freon 12 is employed, the low latent heat of evaporation causes an excessive amount of vapor flashing during throttling, which interferes with the float operation. Location of the float inside the evaporator or accumulator, or use of a pilot float operated valve, eliminates evaporation in the float chamber.

High pressure float valves control the level of liquid refrigerant in the condenser or receiver, as shown in Fig. 2, thus maintaining the proper level in the evaporator. Systems employing such valves require an exact quantity of refrigerant. If the system contains an excessive amount, the liquid refrigerant coming into the float chamber continuously will keep the valve open. This will permit the refrigerant to drain continuously into the evaporator and, under light load, cause a flood back to the compressor, resulting in inadequate refrigeration and compressor slugging.

Too small a quantity of refrigerant in the system will starve the evaporator, also resulting in inadequate refrigeration.

Automatic expansion valves, Fig. 3, regulate the flow of liquid refrigerant to the evaporator in accordance with the pressure existing in the evaporator. The valve needle is actuated by a bellows, one side of which is subject to the evaporator refrigerant pressure, which tends to close the valve, while an adjustable spring on the opposite side of the bellows tends to open the valve.

When the compressor is stopped, the build-up of pressure within the evaporator overcomes the spring pressure and the bellows closes the valve. When the compressor again starts, it draws vapor from the



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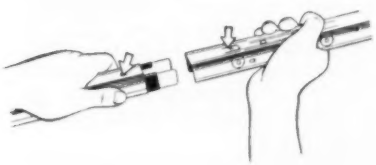
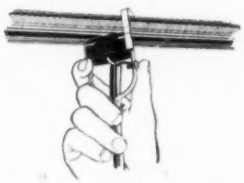


Quickly installed. Sections go up in a hurry, join without bolting. Sections are prefabricated, standardized in lengths of 5 and 10 feet. Entire duct can be dismantled and reinstalled easily without a scrapped part.



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evaporator, thus lowering the pressure on the valve bellows and the spring opens the valve to admit additional refrigerant. If the compressor does not remove vapor from the evaporator as rapidly as it is generated, pressure builds up again on the valve bellows and closes the valve. Actually the valve remains open while the compressor is operating and assumes a balanced position between full open and full closed, in accordance with evaporator refrigerant requirements, maintaining a fixed pressure within the evaporator. This pressure may be changed by changing the valve spring pressure adjustment.

Some automatic expansion valves are provided with a graduated pressure scale on the adjusting knob. This permits accurate pressure setting before installation of the valve, without the use of a gauge. When the compressor stops, build-up of evaporator pressure will again close the valve.

This type valve is not usually suitable for use with remote type evaporators. The evaporator may be full of refrigerant yet, because of light load, not generating vapor as fast as the compressor is removing it. This low evaporator pressure will keep the valve open and overflow the evaporator, thus flooding back to the compressor. For this reason valves of this type are generally employed on factory-assembled coolers, where the valve has been applied with careful consideration of requirements.

Since automatic expansion valves maintain a constant evaporator pressure, they cannot be used with a pressure type temperature control.

Thermostatic expansion valves, Fig. 4, are similar to automatic expansion valves and function in the same manner, insofar as closing on evaporator pressure rise during compressor shutdown and opening on evaporator pressure drop during pumpdown.

However, a second bellows is provided and opposes the action of the first bellows. This second bellows is acted upon by pressure in a control bulb and tube connected to the valve. This bulb and connecting tube are charged with refrigerant

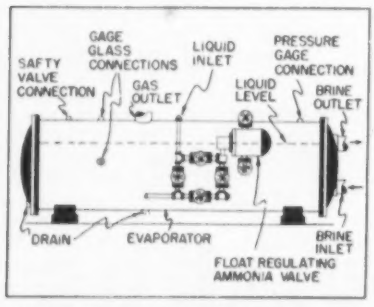

Fig. 1. Low pressure float valves control level of refrigerant in evaporator

liquid or gas. Since the bulb is clamped to the evaporator suction gas line, as shown, the temperature of the suction gas leaving the evaporator will determine the refrigerant pressure in the control bulb and connecting tube, and hence on the second bellows in the expansion valve.

Thus, as the temperature of the refrigerant gas leaving the evaporator rises, the pressure on the second expansion valve bellows increases, until it overcomes the suction pressure on the first bellows and opens the valve.

As the refrigerant entering the evaporator boils, the temperature of the suction line drops, and with it the control bulb temperature. This lowers the pressure on the expansion valve second bellows and permits the pressure on the first bellows to close the valve.

Some thermostatic expansion valves are equipped with a diaphragm instead of two bellows. This type of valve operates in the same

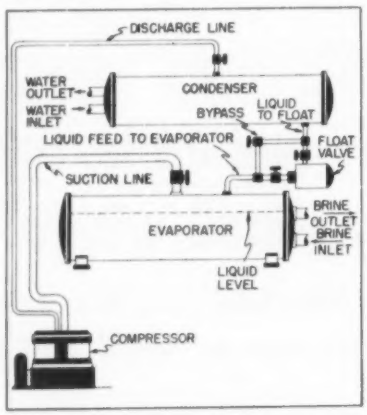

Fig. 2. High pressure float valves control the level of the liquid refrigerant in either the condenser or the receiver

manner as the bellows type however, since the control bulb pressure is applied to the top of the diaphragm, while the evaporator pressure and adjustable spring pressure are applied to the bottom.

With thermostatic expansion valve control the desired degree of evaporator refrigerant heat absorption (superheat) can be maintained. This is usually anywhere from five to ten degrees above F above the saturated temperature of the boiling refrigerant. Superheat adjustment is made by increasing or decreasing the pressure on the adjustable spring in the expansion valve, by means of a packed external adjusting stem. The greater the resistance to opening of the valve under the influence of control bulb pressure, due to temperature rise in the evaporator, the greater will be the degree of superheat. Conversely, superheat is reduced by decreasing the valve opening resistance pressure. However, some thermostatic expansion valves are non-adjustable, being factory-adjusted to maintain a fixed evaporator superheat, usually 10 F, unless otherwise specified.

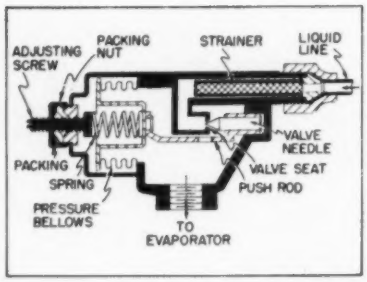

Fig. 3. Cross section of automatic expansion valves which regulate the flow of liquid refrigerant to the evaporator

Full evaporator efficiency depends on a low degree of superheat. In setting the superheat adjustment of a thermostatic expansion valve, never guess the superheat of the vapor leaving the evaporator. Instead, check the temperatures at the evaporator inlet and outlet with clip-on thermometers and wells, as shown in Fig. 5. To obtain accurate readings, place oil in the wells to aid in heat transfer between the wells and thermometers.

Do not attempt to adjust the expansion valve until the evaporator temperature has pulled down within the operating range. The entire surface of the evaporator should be active. The temperature of the refrigerant can be determined from the pressure temperature chart by adding the pressure drop in the evaporator and suction line to the operating suction pressure.

When making superheat adjustments, turn the adjusting stem only ¼ turn at a time, allowing several minutes for the valve to balance each change before making the next change. The proper setting will be such as to maintain the evaporator cooling effect throughout its length, but not permit liquid refrigerant to pass into the suction line. Several complete cycles will be necessary as a check of this.

The valve adjusting stem sealing cap or plug should always be replaced and tightened securely on the gasket (if provided) to prevent condensation.

The function of a thermostatic expansion valve is to regulate the flow of refrigerant into the evaporator, so as to keep the evaporator fully refrigerated by maintaining a balance between the evaporator pressure and the suction line temperature. Therefore, when the system is not operating properly, it is usually not advisable to disturb the expansion valve until extensive checks show that no other part of the system is at fault, because it is

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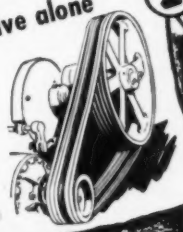

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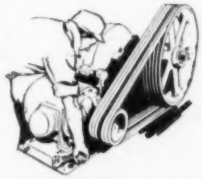

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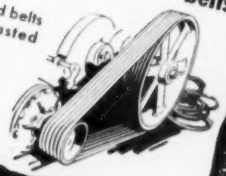

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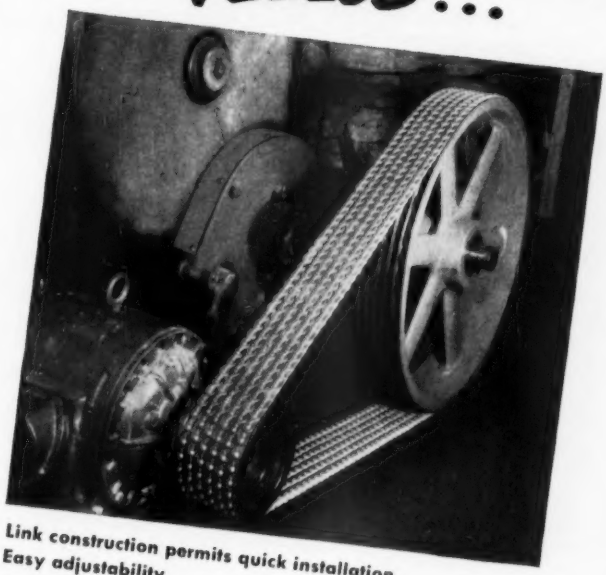

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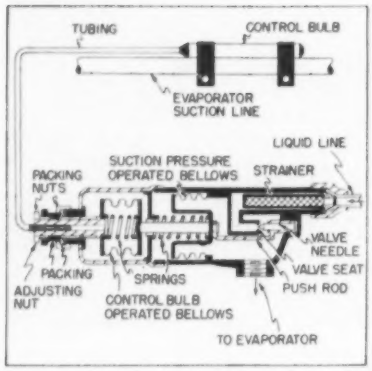


Fig. 4. Thermostatic expansion valves are similar to automatic expansion valves with exception of second bellows which opposes action of the first

unlikely that the valve is not maintaining the proper balance.

Where the evaporator pressure drop is greater than 2 or 3 psi, the thermostatic expansion valve should be fitted with an external equalizer connection, to provide efficient and sensitive superheat control. The external equalizer connection connects with the suction line at the evaporator outlet.

Some thermostatic expansion valves are arranged for optional internal or external equalization.

Where more than one thermostatic expansion valve and evaporator requiring external equalizer connections are employed on a refrigerating system, the equalizer tube of each valve should be connected to the evaporator it controls, just beyond the point of excessive pressure drop. This will insure maximum evaporator efficiency, by permitting only the suction pressure of each evaporator to be transmitted to the equalizing chamber of the valve controlling it.

Thermostatic expansion valve power units are charged with either gas or liquid refrigerant. The gas-charged valves possess the advantage of quicker system balance and fast positive action. Also, motor overload during pumpdown is eliminated, because the valve remains closed until the suction pressure is reduced to a predetermined amount. The valve then opens and functions in the usual manner. However, gas-charged valves should be installed with the outlet pointing down, and they should not be located beneath the evaporator, as the power element may become colder than the control bulb and close the valve and starve the evaporator.

Liquid-charged valves may be installed in any position (upright, sidewise, or inverted) or lower than the control bulb wthout affecting operation. Though it is advisable, on low temperature installations, to install the valve with the outlet pointing down, to prevent oil collecting in the valve lowside. Liquid-charged valves may also be placed in an ambient temperature either warmer or colder than the bulb without losing control at any time. However, the usual liquid-charged valve opens as soon as the compressor starts, thus imposing a heavy load on the motor due to high suction pressure, especially if the system is warm.

To avoid motor overload due to high suction pressure starting, some liquid-charged valves are provided with an extra diaphragm unit, separately charged, which limits the operating suction pressure to a predetermined setting. In operation, if the suction pressure builds up beyond normal, the valve automatically closes until the suction pressure is reduced to normal, after which the valve functions in the usual manner.

In some larger size thermostatic expansion valves, the highside liquid refrigerant is pre-cooled before reaching the valve orifice, to reduce the volume of entrained gas and produce a denser stream through the orifice, thus improving system balance.

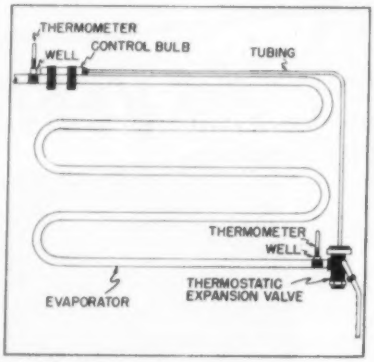


Fig. 5. When setting superheat adjustment of valve check the temperature at evaporator inlet and outlet with these clip-on thermometers and wells

In extremely low temperature refrigeration (minus 100 degrees F), the ordinary thermostatic expansion valve is unsatisfactory, since starving of the evaporator, or reduced valve capacity, or surging will usually result.

To overcome these difficulties a specially designed differential temperature expansion valve is employed, as shown in Fig. 6. This valve operates from temperature only, thus eliminating the use of the suction pressure as an operating force. Two opposed power elements are employed. One element is connected to a control bulb clamped to the evaporator outlet suction line, in the same manner as the conventional expansion valve control bulb. The other element is connected to a control bulb clamped to the evaporator feed line, between the expansion valve and the evaporator inlet. The difference in temperature (superheat) between the locations of these two control bulbs controls the flow of refrigerant into the evaporator to keep it fully refrigerated during compressor operation.

Ethane is employed to charge both power elements of this valve. The pressure of this refrigerant gas changes almost 1 psi. for each 1 degree F change in control bulb temperature. This permits the use of a relatively small valve orifice and wide opening needle, thus minimizing the chance for moisture, wax and dirt to plug the orifice, and also insuring smoother metering and eliminating surging during pulldown.

Since this differential expansion valve does not open until the evaporator bulb temperature drops to minus 30 F, where pulldown time is a factor, a standard thermostatic expansion valve may be connected in parallel with the differential valve. This extra valve then feeds refrigerant until the suction temperature drops to minus 30 F, when the differential valve opens. The standard expansion valve should be adjusted for a superheat higher than that of the differential valve.

To prevent loss of control, the differential expansion valve should be installed outside the refrigerated space, if possible, to prevent the power elements from becoming colder than their control bulbs.

An integral auxiliary expansion orifice is provided in the differential valve to bypass the main valve orifice.

As soon as the compressor starts and the solenoid valve opens in the refrigerant feed line to the expansion valve, this auxiliary orifice permits refrigerant to pass through the valve and cool the evaporator control bulb to a temperature of minus 30 F, so as to allow the superheat power element force to overcome the evaporator power element force and open the main valve orifice.

Thermostatic expansion valves are usually arranged for capacity variation. In some, the valve and orifice assembly is removable, permitting any size valve assembly, within the

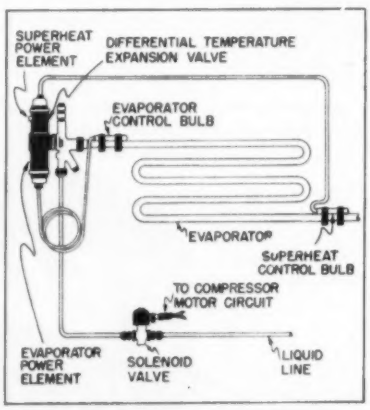
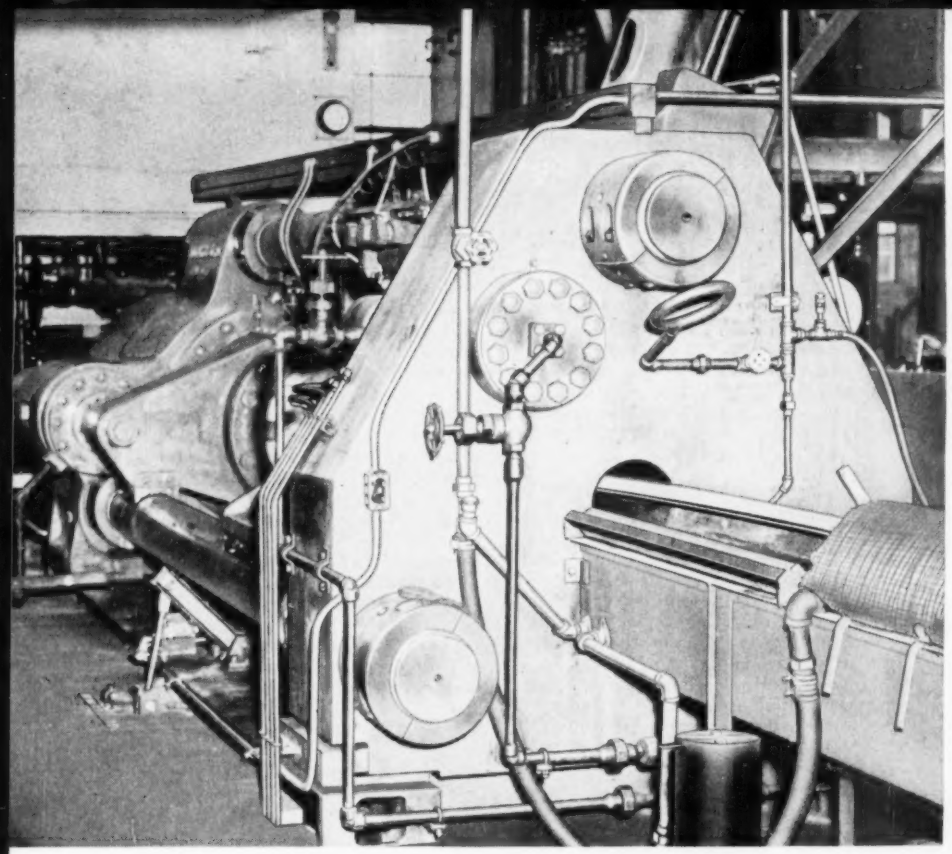


Fig. 6. For extremely low temperature refrigeration: a specially designed differential temperature expansion valve



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expansion valve capacity range, to be installed.

In other valves, a selection of different sized orifices is provided for installation in the valve body.

In another type valve, the orifice is adjustable. This provides a variety of capacities, and, usually, the flow of refrigerant through a valve of this type can be properly regulated without the time-consuming operation of adjusting superheat.

In installing thermostatic expansion valves, it is important that the manufacturer's instructions be followed, particularly as regards the control bulb location. The control bulb should never be installed near a warm object, or where warm air may strike it, otherwise it may be necessary to insulate the bulb to prevent the valve opening during the compressor shut-down period.

Strainers should be provided in the liquid refrigerant feed line before all expansion valves, unless a strainer is built into the valve.

Usually refrigerating systems should be provided with a drier, or a drier-filter, to prevent moisture circulation and consequent freezing of expansion valves. But such driers should be of a type that will not permit the drying agent to become dispersed in the system.

Types of Solenoid Valves Used

Solenoid valves are generally employed in liquid refrigerant feed lines, though they are also used in suction lines, and for cooling water control. These valves are made in direct magnetic action and in lever magnetic action, the latter arrangement increasing considerably the power of the solenoid. The larger sizes usually are pilot operated.

Some solenoid valves are provided with a manual opening stem. This feature permits the valve to be operated in the event of solenoid failure.

Thermostats are employed on some systems to operate solenoid valves in liquid refrigerant feed lines to expansion valves, the temperature of the refrigerated space actuating the thermostat to open and close the solenoid valve circuit. These thermostats are adjustable.

Cooling water regulating valves are operated by the high pressure side of the system, to regulate the flow of condenser water and thus maintain the proper degree of refrigerant gas pressure. These are usually readily adjustable for variations in water temperature.

Motor controls are of two general types, pressure and thermostatic. Pressure controls include low pressure control and high pressure cutout.

Low pressure controls are employed to start and stop the compressor according to evaporator suction pressure. They are provided with adjustments and indicating calibrations so that the point of pressure rise at which it is desired to start the compressor and the point of pressure drop at which it is desired to stop the compressor can be set according to refrigeration requirements.

High pressure cutout controls protect the system from excessive pressures on the high pressure side. This pressure setting may or may not be adjustable. Some controls are arranged to stop the compressor on rise of pressure to the control setting and start it again when the pressure has dropped a certain amount; other controls lock out the compressor motor circuit until reset manually.

Low and high pressure controls are made in individual and in combination types.

Thermostatic controls start and stop the compressor on rise and fall of temperature in the evaporator or in the refrigerated space. The points of temperature rise and fall at which it is desired to start and stop the compressor are adjustable in the same manner as pressure controls.

Low pressure or temperature controls are also available with signal alarm, to warn of rise of pressure or temperature a fixed amount above the compressor motor starting setting.

One type of temperature control is called a "two-temperature" control. This provides uniform refrigerated space temperatures and uniform high relative humidity, and complete automatic evaporator defrosting.

The control starts the compressor only when the evaporator is defrosted, and stops the compressor only when the air in the refrigerated space is cooled to selected temperature.

Evaporator defrosting controls are made in several types. One is a simple electric clock operated mechanism for automatically stopping the compressor for a selected defrosting period, then starting it again.

Defrosting Controls

Another type automatically stops the compressor at selected time intervals for defrosting, by means of an electric clock mechanism. When the suction pressure builds up to that corresponding to a defrosted condition of the evaporator, the compressor is again started. This type is called a "time-pressure defroster."

Still another type, called a "hot gas defroster," automatically directs hot gas from the compressor discharge through the evaporator, by means of a special bypass valve, and thus quickly defrosts the evaporator at predetermined intervals.

An oil protection control is available for pressure lubricated refrigerating equipment. This control will stop the compressor if the difference in pressure between the lubricating oil and the suction pressure drops below the control setting, which is adjustable. A time delay device will permit the compressor to run 90 seconds after starting, to establish pressure differential. After 90 seconds, continued pressure differential failure will lock out the motor control and require manual reset for restarting the compressor.

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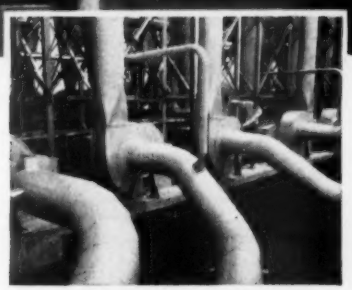
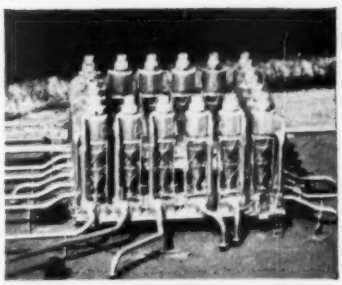
The answer? A dust collection system was designed and installed by Kirk & Blum using 32 powerful Westinghouse-Sturtevant fans. Through individual hoods serving each machine, 218,000 cfm of air picks up dust particles and carries them to collectors on the plant roof. Although completely exposed to the elements, expert engineering and rugged construction has given these fans the ability to "take it" and still perform at top efficiency the year 'round.

To help you *put air to work*—with air handling, air conditioning or air cleaning—Westinghouse offers a complete line of industry-proven equipment to meet your individual needs. See the new General Catalog 600, a 60-page reference file, describing the full product line and its industrial applications. To get a free copy, call your local Westinghouse-Sturtevant office, or write Westinghouse Electric Corp., Sturtevant Division, Hyde Park, Boston 36, Mass.



Carefully designed blades in these Westinghouse fans give highest operating efficiencies with lower power consumption.



A 20-collector Kirk & Blum system handles dust particles 100 microns and smaller in size with 99.5% collection efficiency.

YOU CAN BE SURE... IF IT'S Westinghouse

J-80271

AIR HANDLING

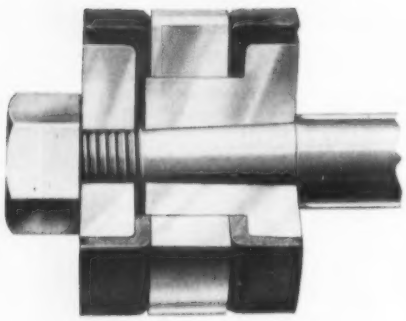
*Reg. U. S. Pat. Off.

For more facts circle 562 on Reply Card

New Garlock Molded Cups Folder describes in detail our complete line of cups. Write for your copy today! ▸

GARLOCK MOLDED CUPS

For Pump Pistons, Hydraulic Service, Pneumatic Equipment



Garlock Cups for Pump Pistons are available for standard cylinder sizes.

A COMPLETE LINE OF CUPS FOR INDUSTRIAL USE

GARLOCK Molded Packing Cups are made from the highest grade materials to rigid specifications for *long, trouble-free service.* These cups are made in many types and styles, each designed and constructed for a specific service condition.

BITAN* Leather Cups, available for practically any cylinder diameter size, are recommended for use against cold and hot water, oils, gases, and solvents. For hot oil service up to 250° F., specify synthetic-rubber-impregnated Bitan leather cups.

Rubber and Synthetic Rubber Cups with fabric insertion are made in a wide range of material combinations for cylinder diameters from less than ½" up to and including 16". For service against air at high or low pressures, against oils, and on heavy duty hydraulic equipment.

Start cutting maintenance and replacement costs now—standardize on Garlock Molded Cups.

*Registered Trademark

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK
In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK

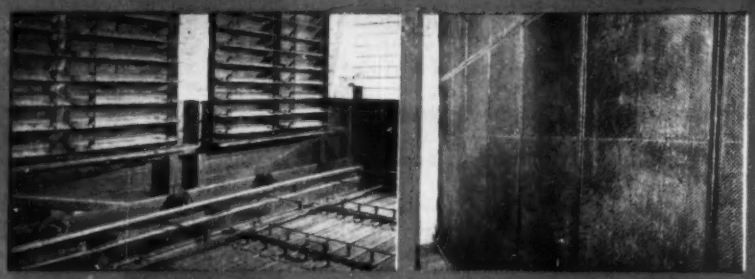
PACKINGS, GASKETS, OIL SEALS, MECHANICAL SEALS, RUBBER EXPANSION JOINTS

For more facts circle 563 on Reply Card

Parlon Stays On!

"...Parlon paint has protected our air conditioning against moisture, grease and dirt for over 10 years"

Below: Louver system of air-washing unit at Judson Mills and baffles in front of electric filter, which cleans air, are located in blending room. Both are given longer life with a protective coating of Rubalt RA paint based on Parlon. Here, this sturdy finish must withstand constant humidities of 96% at 51° F. In addition to excellent protection against corrosion, Parlon finishes resist mold and algae growth simulated by the presence of yarn size in the atmosphere.



Giant fan units at Judson Mills, like that above, are now painted prior to installation, and at 18-month intervals, with Rubalt RA paint based on Parlon. This system protected oldest fan, still in steady operation, for more than 10 years against all effects from corrosion.

In all air conditioning equipment, moisture poses a constant problem. In textile mills, add the grease, dirt, and other corrosive elements picked up in the system and it is easy to understand why parts rust out and need replacement after only a few years of use. Most paints, even though applied frequently, provide inadequate protection.

At Judson Mills, Greenville, S. C., where paint based on Hercules Parlon (chlorinated rubber) has been applied every 18 months, equipment remains in good operating condition 10 years after installation! Metal parts are still in excellent shape. Moreover, Parlon does not flake off and escape into the circulating system and contaminate valuable fabrics being loomed in the factory. For this reason, Judson now paints all of its new equipment with Parlon before installation.

Wherever corrosion is a problem, Parlon gives better service at lower long-term costs. See your paint supplier for details, or write:

Cellulose Products Dept., HERCULES POWDER COMPANY 946 Market St., Wilmington 99, Del.

Parlon® CHLORINATED RUBBER PAINTS

AVAILABLE FROM 400 PAINT MANUFACTURERS UNDER THEIR OWN BRAND NAMES

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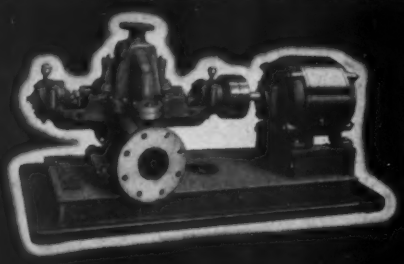
WARREN...the most complete line of industrial pumps available from one source

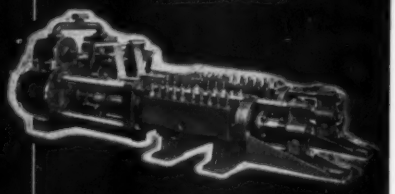
CENTRIFUGAL • RECIPROCATING • SCREW • ROTARY

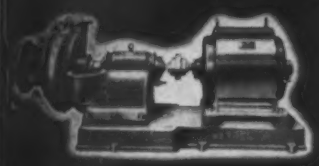
Warren-Quimby Gear-in head Screw Pump



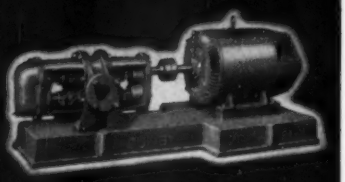
Warren Condensate Pump

Warren Horizontal Duplex Hydraulic Pump

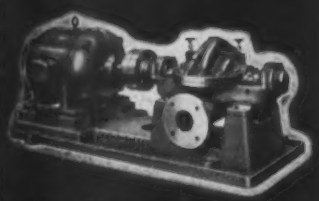




Warren Type "L" Single-Stage Single-Suction Liquor Pump



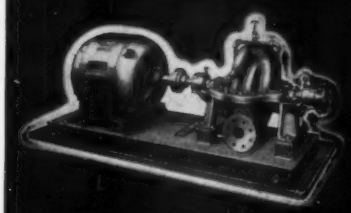
Warren-Quimby External Gear and Bearing Rotex Pump



Warren Type DBL, Single-Stage Double Suction, Centrifugal Pump

There's a Warren or Warren-Quimby Pump for practically all industrial pumping applications, and our large variety of types and sizes assures an unbiased recommendation. The value of this should not be underestimated because a recommendation that barely meets operating conditions and requirements can prove to be anything but a profitable long range investment, regardless of any initial advantage in cost.

It will pay you to check with Warren on your next pumping job.



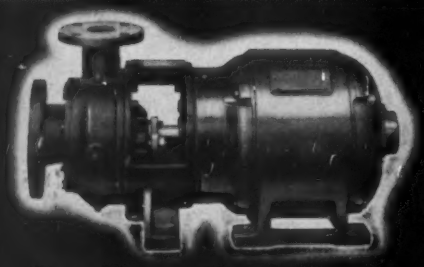
Warren Two-Stage Volute Centrifugal Pump

WARREN QUIMBY PUMPS

WARREN STEAM PUMP COMPANY, INC.

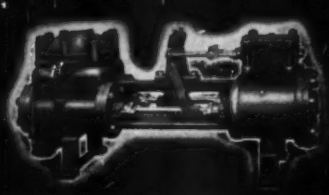
WARREN, MASSACHUSETTS

Warren 4- and 6-Stage Centrifugal Pumps



Warren "Compacunit"—4 Types—42 Sizes

Warren Horizontal "Realwear" Duplex Piston Pump



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FAST WAY TO WIRE NEW OR OLD PLANT

Ford Motor Company rewired plant, saved money, maintained production by using G-E No. 1799 varnished-cambric-insulated interlocked armor cable system

It's quite a feat to rewire a plant in a hurry, keep costs in line, and maintain production at the same time. But the Ford Motor Company did just this in their Canton, Ohio plant—they used General Electric's No. 1799 varnished-cambric-insulated interlocked armor cable system. All cables shown in the illustrations are 3-conductor, 500,000 CM for 15 kv service.

Installation speed—The ease and speed with which this interlocked armor cable system can be installed lowers costs. The cable can be laid quickly—indoors or outdoors—in long lengths, around corners, on *low-cost* aluminum *racks*. Engineering time is cut. Threading or bending of conduit is eliminated. Splices are of a simple mechanical type. Ford saved months, not days, because of these features.

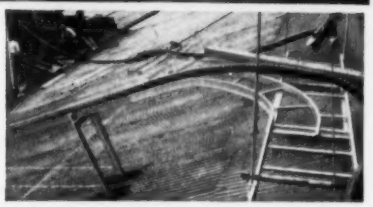
Permanent—To our knowledge, no installation of interlocked armor cable has ever suffered mechanical damage sufficient to cause electrical failure. It is versatile as well as permanent and makes a neat, clean-looking installation. For more information about the G-E No. 1799 varnished-cambric-insulated interlocked armor cable system, write Section W57-164, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

Saves money at low voltages, too

G-E No. 1799 varnished-cambric interlocked armor cable also saves money at low voltages as indicated in the chart below.

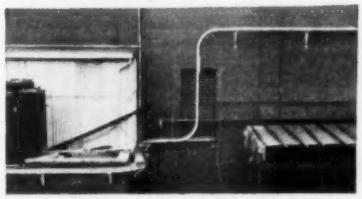
Rated capacity 2000 amperes at 480 volts	Pounds of Critical Material per 100 Feet		Cost per 100 Feet
	Copper	Steel	
Varnished cambric insulation in interlocked armor cable*	**2375**	**1168**	**$3000**
Impregnated asbestos and varnished cambric in steel conduit	2781	4140	$3954
Varnished cambric and braid in steel conduit	2781	4140	$3966
Type RH rubber insulation in steel conduit	3475	4910	$4660
Aerated bus-way	3000	990	$4976

*Figures based on steel racks. Aluminum racks are normally used because they are lighter and easier to handle.



Cable being pulled around the first of 5 right angle bends of a 500 ft pull. Note racks can be hung from a roof projection and mounted on a stand.

A simple catenary suspension carries racks between buildings—underground construction is eliminated—cable on racks is always available for visual inspection.



Racks to carry the cable can also be mounted on the side of a building. This photograph shows 4 right angle bends.

Flexibility of interlocked armor cable is demonstrated here—corners and projections present no installation problems.

You can put your confidence in—

GENERAL ELECTRIC

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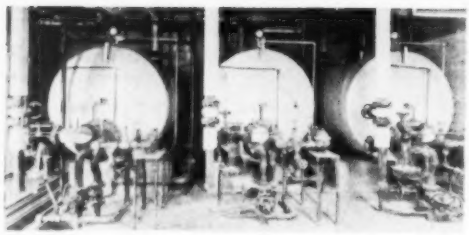

when your water runs hot to cold...

...better call p-k for a new look at your hot water supply

ENOUGH clean, hot water when needed is vital for people or processes—utility services or plant operations. You get dependable hot water supply with a balanced installation of p-k hot water storage heaters.

Proved in long-time service in thousands of installations—in laundries, hotels, institutions, commercial buildings and general industry—p-k hot water storage heaters are the most dependable your money can buy—to save you money.

This dependability and overall efficiency is bred from decades of concentrated experience in designing and building storage heaters and other heat exchange equipment. p-k engineering experience shows you the right type of heater that will serve you best—whether the shell be carbon steel, copper silicon, copper lined, copper clad, galvanized or cement lined—vertical or horizontal. One type is right for any specific installation, depending on the liquids you handle and the results you require. p-k engineers know all the answers, place your confidence in them.

Before you settle on plans for new and better storage heaters, why not ask the p-k experts, who have been designing and making dependable storage heaters since 1880. 1915

the Patterson-Kelley Co., Inc.

1310 Burson St., East Stroudsburg, Penna.

101 Park Avenue, New York 17 • Railway Exchange Building, Chicago 4 • 1700 Walnut Street, Philadelphia 3 • 96-A Huntington Avenue, Boston 16 • and other principal cities

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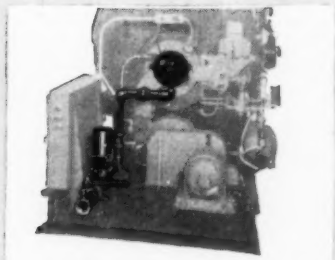
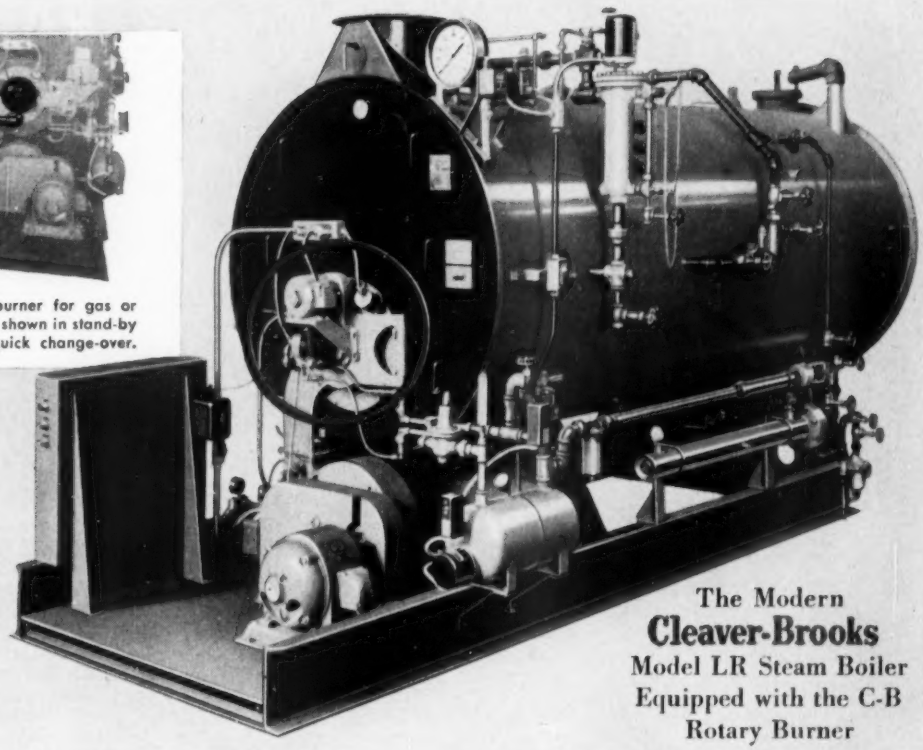
unmatched Flexibility of operation ...and of quick fuel change-over



Combination burner for gas or oil. Oil burner shown in stand-by position for quick change-over.



The Modern **Cleaver-Brooks** Model LR Steam Boiler Equipped with the C-B Rotary Burner

✔ **Quick Steaming—Fast, effortless response to fluctuating steam demands**

✔ **Equally high efficiency using heavy No. 6 oils (or lighter oils) and all types of industrial gas**

IF the quantity of steam required in your plant fluctuates throughout the day, depending upon the amount of steam-using equipment in operation, you can cut your steam costs substantially with a Cleaver-Brooks Boiler. It operates at a full 80% guaranteed efficiency whether you require maximum load use of all steam-using equipment . . . or whether your equipment is not in use, requiring as little as 30% response — often just enough to heat the plant.

Install a Cleaver-Brooks Boiler — oil, gas, or combination — either fuel properly proportioned by the exclusive Cleaver-Brooks Burner to meet your fluctuating or constant steam demand. Fully automatic, clean, with a single source for all of its matched parts . . . you benefit with lower fuel bills, less maintenance, reduced operating costs, greater profits. Why not consider changing your present boiler plant and think of flexibility — remember Cleaver-Brooks and get the complete facts on boilers, 15 to 500 HP — 15 to 250 psi.

Write for latest, fully illustrated and descriptive Cleaver-Brooks Steam Boiler catalog.

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STEAM BOILERS
the first and finest of their class

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Dept. A—306 E. Keefe Ave., Milwaukee 12, Wis., U. S. A.
Cable Address: Clebro-Milwaukeewis

Builders of Equipment for the Generation and Utilization of Heat • Steam Boilers • Oil and Bitumen Tank-Car Heaters • Distillation Equipment • Oil and Gas-Fired Conversion Burners

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get MORE for your truck dollar from

A combination of fork and low lift platform trucks are used in this large grocery warehouse to gain the advantages of both. This platform truck is making a long haul to the order-picking section. A fork truck will later place the top load on the floor.

because ELWELL-PARKER—

Furnishes ALL types—Elwell-Parker gives *unbiased* advice since it produces both gas and electric trucks. Basic models include high and low lift platform trucks, fork trucks, mobile cranes, tractors.

Builds trucks that cost less to operate—Unequalled design experience cuts maintenance costs and expensive delays due to truck breakdowns.

Offers FREE analysis by materials handling consultants—Resident E-P field men in all principal cities will survey your plant and help you select the most efficient handling system.

Provides service help—E-P Service Engineers make periodic calls to instruct your drivers and advise your maintenance department about proper servicing.

Get the full story on these *Plus Features* by writing for this General Catalog. The Elwell-Parker Electric Co., 4175 St. Clair Ave., Cleveland 3, Ohio.

ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

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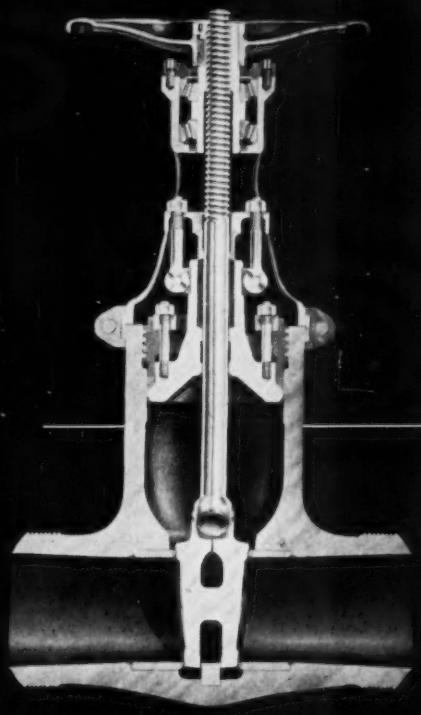


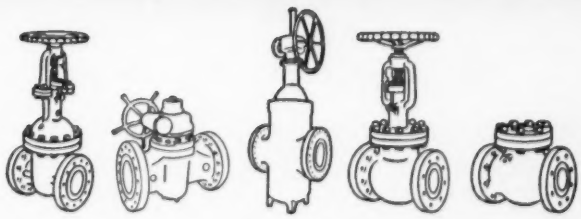
STEEL

COMPLETE LINES OF CAST STEEL VALVES AND PIPE FITTINGS are manufactured by Walworth in a variety of pressure classes, types, sizes, and patterns for general industrial use. Walworth also manufactures cast steel valves for specific service applications.

Walworth produces steel bar stock valves, and cast steel valves made of carbon steel, carbon molybdenum steel, corrosion-resistant, and heat-resistant alloy steels. Included are gate, globe, angle, check, and lubricated plug types. Sizes range from ⅛ to 30 inches; pressures range up to 5,000 psi. Full information is contained in Walworth General Catalog 52, a copy of which will be forwarded if requested on business letterhead.

Walworth also manufactures complete lines of valves and fittings made of bronze, iron, and special alloys as well as steel. Walworth-made valves, fittings, and pipe wrenches total approximately 50,000 items.

Walworth engineers will be glad to help you with your problems. For full information, call your local Walworth distributor, nearest Walworth sales office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, New York.



Illustrated in section is an 8-inch Series 900, Walworth Pressure-Seal Cast Steel Gate Valve designed for high-pressure, high-temperature service. Pressure-Seal Valves are available in Series 600, 900, 1500 and 2500; sizes 1 to 16 inches. Small Cast Steel Valves, Series 1500, in angle and Y-globe types, are also available in sizes ranging from ¼ to 2 inches.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

EASY OPERATION OF ULTRASONIC CLEANING ELIMINATES CUMBERSOME BATHS AND TIME SPENT HANDLING PARTS

Parts cleaning time slashed 80%

Bearings cleaned faster, more thoroughly, by G-E Ultrasonic Generator

50 PRECISION PARTS can be placed in the beaker and cleaned in less than one minute with ultrasonics

Miniature Precision Bearings, Inc., of Keene, New Hampshire, pioneer manufacturers of precision ball bearings in miniature sizes, has reduced cleaning time of ball-bearing parts by more than 80% by adopting a General Electric Ultrasonic Generator.

In manufacturing these small bearings, each part must be measured and tested many times during fabrication. This manufacturer formerly used forced-air cleaning and time-consuming hand dipping to clean components. Now, with ultrasonic cleaning, fifty parts can be cleaned by one operator in less than one minute to meet rigid inspection—cutting rejects of assembled bearings.

G-E Ultrasonic Generator has been found increasingly effective for cleaning of small parts; cleans in inaccessible corners, small holes, and wherever complicated shapes exist.

For further information about applying ultrasonic energy for cleaning contact your nearest G-E Apparatus Sales Office, or write for Bulletin GEA-5669 to General Electric Co., Section 687-115, Schenectady 5, New York.

You can put your confidence in—

GENERAL ELECTRIC

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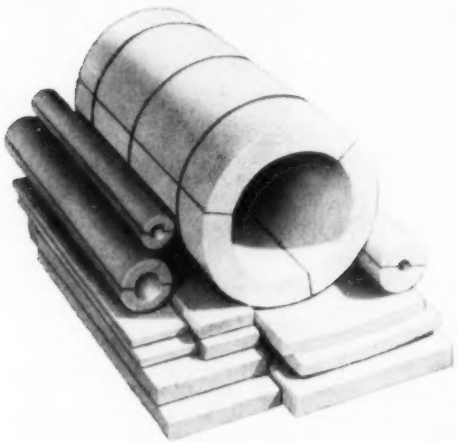
How to Get the Most Out Of Your Insulating Dollars

The Right Material . . . Expert Application



First, Kaylo Heat Insulation is *proved* a *better* material—hydrous calcium silicate. Its light weight, strength, water-insolubility, low conductivity and wide temperature range give you extra advantages *at no extra cost.*

Second, Kaylo distributors have the technical knowledge and experience to provide you with a complete insulating service. Their trained applicators are skilled craftsmen who do neat and efficient installation.

To be *sure* of getting the most out of your insulating dollars for your next job, call the nearest Kaylo distributor. Chances are you can find him listed in the yellow pages of your phone book. If not contact us and we'll give you his name.

WRITE FOR FREE BOOK—"Kaylo Heat Insulation." Address: Dept. N-394, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

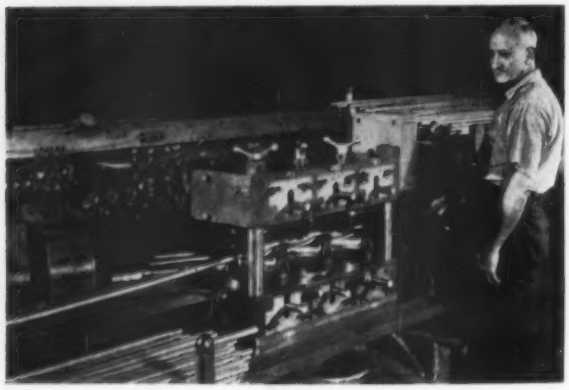
KAYLO® . . . first in calcium silicate

. . . pioneered by OWENS ILLINOIS Glass Company

MAIN OFFICE: TOLEDO 1, OHIO—KAYLO SALES OFFICES: ATLANTA • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS

For more facts circle 572 on Reply Card

Rotary Straightener Speeds Brass, Copper and Aluminum Tube Production

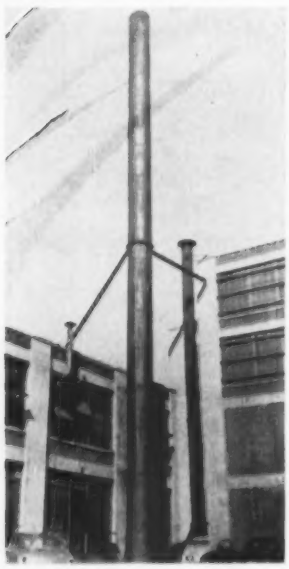


A rotary, guideless straightener straightens 120 ft of tube per minute at the Waterbury, Conn., plant of the American Brass Co. The straightener delivers brass and copper tubing exactly to customers' specifications, meeting a deviation of only 0.015 in. per ft of tubing. No additional manual straightening is required.

The plant uses one rotary machine to straighten 5/32 to 7/16 in. diameter seamless brass and copper tube. A larger rotary machine works on tube ranging in diameters from 5/16 to 1 in., and produces tubing within tolerances at an average speed of 400 ft per minute.

These machines, built by Mackintosh-Hemphill Co., also serve in restoring ovaled tube to perfect roundness. A ½ in. soft copper tube, 0.014 in. out of round, was brought back to within 0.001 in. of roundness, and a similar restoration was done on ½ in. aluminum tube.

Welded Stack Raised in One Day



Erected in only one day by workers of the C-W Boiler Company, Holliston, Mass., a wrought iron smokestack, 100 ft high by 4 ft in diameter, serves the Farrington Mfg. Co., Boston.

The stack was prefabricated in three sections at the C-W Boiler Company shops and trucked to the plant site where the sections were welded together.

Engineers of the Farrington Company selected wrought iron plate to achieve maximum service life for the installation and to protect against corrosive flue gases from the plant's incinerator and boiler.

Hydraulic Ramp Tilts Trailers

Shipments of coke and carbon products between International Graphite & Electrode Division and its parent company, the Speer Carbon Co., have been materially speeded up through the use of a hydraulically elevated truck unloader which can unload 20,000 lbs. of coke from a trailer truck in 1 minute.

The unloader, built by the Kewanee Manufacturing Co., tilts both the tractor and trailer to a 40 degree angle, dumping the coke into storage facilities where it is kept until processed for the manufacture of electrodes and other carbon and graphite products.

Sectional Layout Board Makes Planning for Building Changes Easier

A new contrivance has been devised as an aid in planning the locations of equipment, facilities, departments, etc., at Boeing's Seattle plant. It is a sectional master-control layout board, 15 ft long and 12 ft high. When assembled in one unit it gives the complete layout of Seattle Plant 1, which covers about 17 acres.

The board is made up of 3-ft-square sections, which slide on a system of runners for easy removal. It replaces about 15 large-size layout boards formerly used. It is marked off in ½-in. squares, each square representing 4 ft. Buildings, interior walls and facilities are shown on the board by lines.

Plywood scale models of every piece of equipment in the plant are used in conjunction with the board. The planners fasten these scale models to the big layout board, in the positions desired. Photographs, taken of the board with the scale models in place, serve as potential floor plans for building changes.

Oversize Steel and Concrete Pipe Feeds Water to Pulp Mill

A 6-mile pipeline which will channel 30 million gallons of water per day into Weyerhaeuser Timber Co.'s new bleached kraft pulp mill is being constructed near Everett, Washington.

The pipeline, built of 32-ft lengths of 40-in. composite steel and concrete pipe, will carry fresh water to the new millsite near the mouth of the Snohomish River. Weyerhaeuser's new mill, scheduled for completion in 1953, will consume the water in producing 250 tons of kraft pulp daily.

The mill is located next to the company's existing sawmills, along the river. This part of the river is reached by tidewater from Puget Sound, making it necessary to tap a source of relatively clean, salt-free water.

Pumps will be located at the "headworks" and will be completely automatic, being controlled remotely

from the mill. Water arriving at the plant will be treated in huge concrete settling tanks before being introduced into the pulping process.

Expendable Pallet Boxes, Electric Lift Trucks Modernize Handling

A materials handling system utilizing expendable pallet boxes and electric lift trucks, has modernized operations at the Columbia Metal Stamping Co., Cleveland, Ohio.

After production of the stampings, largely automotive parts, the finished products are sent to a "washing machine," to be processed for shipment. After the stampings are washed and given a light coating of oil, they are fed by conveyor directly into pallet boxes for shipment.

These boxes are then conveyed to the shipping dock, by lift truck. At the dock, they are loaded directly into trucks. The company reports that introduction of the pallet boxes and lift trucks has resulted in reduction of loading time from an average of 2½ hours to 20 minutes per truck. Seventy-five per cent of the company's shipping is now done in the expendable pallet boxes, with plans to increase this to full usage. The

electric trucks used by the company are manufactured by the Automatic Transportation Co., Chicago.

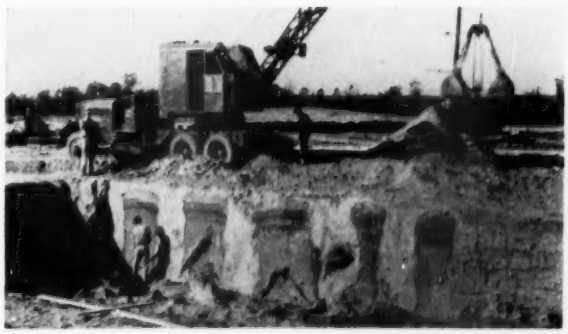
Vibration Method Forms Compact Sand Columns to Hold Building

The first large plant in the United States to be constructed on compacted sand is being built at Bonnie, Florida, for the International Minerals and Chemical Corp. A saving of a quarter-million dollars is expected from a new building method used by the Rust Engineering Co., on the 12 million dollar project.

The method, called Vibroflotation, facilitated the building of the plant on the dry wasteland sands, with no other support than the sand itself. It increases the relative density of the sandy soil through a shaking and pushing process that packs the sand grains more closely, thus reducing the voids between the particles.

The process uses a tube called a Vibroflot, containing an electrically driven eccentric. The 10-ton centrifugal force produced by the eccentric vibrates the tube, as it is lowered into the sand, a water jet saturating the sand to permit penetration of the vibrating tube.

Lowered to an average depth of 13 ft, the device by its vibrating action pounds the sand surrounding it into a tighter mass on all sides. Fresh sand is shoveled in from above to fill the space emptied by this compaction.



As the tube is withdrawn, in 1-ft stages, it is run at each stage until the sand is packed solidly at that level. The result is a tightly compacted column of sand, 8 to 10 ft in diameter. These columns, formed on 8-ft centers in an overlapping pattern, provide the necessary bearing capacity for building without piles.

Heated Knives Cut Rayon Strip Without Fraying

The problem of edge-fraying when cutting acetate rayon into strips has been eliminated by the Cameron Machine Co. of Brooklyn, N. Y., through the use of General Electric tubular heaters on the cutting knives.

The straight, electrically heated blades of the new machine melt razor-thin slits in the rayon as the fabric passes between the blades and the rewinder platen roll. While cutting, the blades fuse minute strips along the edges of the cuts to prevent separation or beading. The edges cool instantly and there is no danger of fused layers in the rewound rolls.

Electric Truck Converted into New Industrial Fire-Fighter

Maintenance personnel at the Edgewater, N. J., plant of the Aluminum Co. of America have converted an electric truck for service as a fire-fighting unit. Minimum additional weight, achieved through use of aluminum in fabrication, permits carrying the unit up and down in the plant elevators.

The truck is manned 24 hours per day, by a 3-man crew. It carries a complete array of equipment, including: 500 ft of 1½ in. hose; 200 ft of 2½ in. hose; 4 50-lb carbon dioxide cylinders with hose reel and 100 ft of hose attached; 2 pyrene extinguishers; foamite extinguisher; water pump; foamite solution; booster pumps; ladders; all necessary tools; lanterns and tarpaulins; and personal equipment from helmets to boots.

The unit was developed as a solution to the problem of the multi-story industrial plant: how to concentrate sufficient fire-fighting equipment on a mobile unit.

Extreme Temperature Chamber Aids Aircraft Component Testing

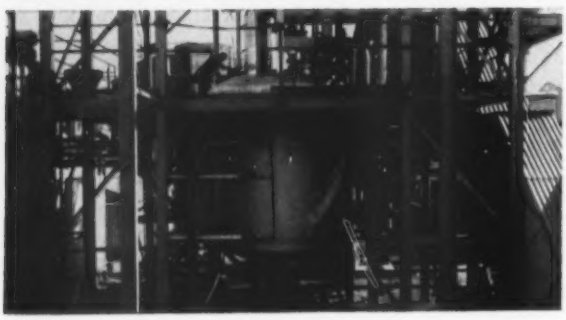
A high-performance extreme temperature chamber has been installed in the engineering laboratories of the Northrop Aircraft, Inc., plant at Hawthorne, Calif.

Air temperature in the chamber can be lowered from 70F to -85F in 10 minutes, and raised from 70F to 180F in 7 minutes. The chamber is designed for operation at any temperature between -100F and 250 F.

The unit was designed by the Industrial Refrigeration Co., and was installed by Northrop. The test chamber and sublimation tank, together with all operating and control accessories, are integrally mounted on a steel base, equipped with casters, for complete mobility.

The fast rate of temperature change in the unit permits several repeat tests in a single day.

Resin-Cooking Kettle "Winterized" for Outdoor Service



At a cost of half a million dollars, Reichhold Chemicals, Inc., world's largest producer of synthetic resins, has just completed construction of a huge 7800-gal. outdoor kettle for cooking several types of synthetic resins. The kettle can cook a single charge of 50,000 lb. of resins at temperatures as high as 600 F.

Believed to be the first outdoor kettle installation ever developed, it is protected against the cold by unique insulation precautions.

If the Elizabeth experiment proves successful through the New Jersey winter, it may pave the way for widespread adoption of outdoor plants up north, with savings in original construction cost and operation.

There's Less TIME OUT

with SUPER-SILVERTOP Steam Traps

Piping must be disconnected to service a conventional inverted bucket trap, but a Super-Silvertop can stay right in the line.

● Plants that trap steam-using equipment with engineered Super-Silvertop Steam Traps find there are four reasons why there is less time out with these cost-saving units.

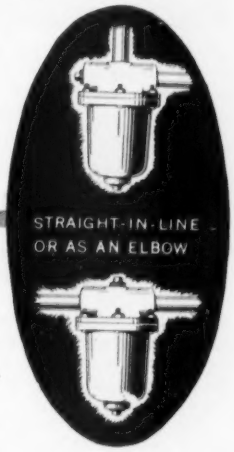
1 **You can service a Super-Silvertop much easier than conventional traps, saving up to 30 minutes time. The body can be removed without disturbing a single fitting.**

2 **Super-Silvertops are easy to install, too. They fit snug, like an elbow or coupling, eliminating unnecessary piping and fittings usually required to hook up conventional inverted bucket traps.**

3 **Super-Silvertops have rugged, longer-lasting Anderloy valves and seats, eliminating continual replacement of parts.**

4 **Guided bucket minimizes bucket damage caused when bucket swings free.**

Thousands of leading plants are saving manhours by changing to Super-Silvertops. You can, too. Write for a copy of the 36-page catalog, "Solving Steam Trap Problems". It tells how.



SUPER-SILVERTOPS
...the Engineered Steam Traps

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Please send me a copy of "Solving Steam Trap Problems".

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City .....
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In Canada: Bawden Industries Ltd., Toronto

For more facts circle 573 on Reply Card

NEW PRODUCTS summarized for your convenience

Edited by M. E. Heniken

1—FLUORESCENT FIXTURE is adjustable to avoid glare

The Flexoliter is announced as a new idea in fluorescent fixtures in which the reflector can be moved by the finger to several positions—directing the flow of light accordingly. The fixture was developed primarily to prevent glare in workers' eyes while focusing light on work. With the Flexoliter a man can reach up and adjust the reflector to send the light at the angle best for the job; but it can easily be changed to fit another light pattern required by the next job.

The flexible steel reflectors have five positions: regular, 100 per cent down; uplight, 20 per cent up and 80 per cent down; glare shielding, 40 per cent up and 60 per cent down; semi-direct, 50 per cent up and 50 per cent down; and indirect, 100 per cent up. (For further information circle No. 1 on Reader Service Card.) Duro-Test Corp.

2—BARREL SKID is lightweight, made of magnesium

Welded throughout, this barrel skid is made entirely of magnesium and is designed to combine extreme light weight

and ease of handling with capacity-rated strength. The skids come in standard sizes from 5 to 18 ft long. (For bulletin circle No. 2 on Reader Sevrice Card.) Magline Inc.

3—FLOORING MATERIAL for both repairing, resurfacing

Trowel-In is announced as the sought-for patching and resurfacing material that can be kept on hand, ready for use in solving many common floor deterioration problems. Company says it can be used on floors of practically any composition—concrete, stone or brick—and that repairs are ready for traffic in 18 hr.

No heat, other materials or special skills are required in the use of Trowel-In, it is stated. As a resurfacing material, it needs only a thickness of ⅜ in. As a patching material it is said to provide true feather edge repairs without chopping out the old floor. It is also suggested as an aid in leveling for linoleum and tile, to help set floor plates and drains and afford protection against water, moisture and vibration. (For descriptive literature circle No. 3 on Reader Service Card.) Flexrock Co.

4—AIR FILTER traps and holds fine pollen, dust

Production is under way on a washable, plastic air filter that traps the pollen, soot and dust particles by static electricity. Named Pliotron, the filter utilizes the inherent conductive characteristic of polyethylene film. It is said to remove much more fine dirt from forced-air heating and air conditioning systems than many filters.

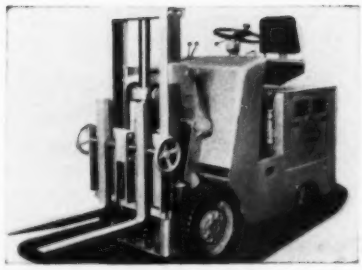
Filtering agent in the new product contains a lifelong electrostatic charge, company explains, and when air is forced through the plastic material it takes on an additional charge. This charge attracts dust particles as a magnet attracts metals. Pliotron filters can be installed without modifications in present forced-air systems. The filter is cleaned by rinsing in clear water and may be replaced without drying. Four sizes are available. (For further information, circle No. 4 on Reader Service Card.) Goodyear Tire & Rubber Co.

5—HUMIDITY CONTROLLER is simple, plug-in device

Offered to meet the need for a simple automatic humidistat control to operate electrically powered humidifiers and dehumidifiers, this control works in much the same way as a room type thermostat. All that's needed is to hang the control on the wall and turn the dial to the percentage of relative humidity desired. When used as a dehumidifier control — if the humidity rises above the setting — the control will turn on the dehumidifier.

To install the control in conjunction with existing humidifiers or dehumidifiers, it is only necessary to plug the unit into the control and plug the control into the nearest 110 v wall outlet. Company says the control can handle almost all modern types of electric humidifiers and dehumidifiers. (For information circle No. 5 on Reader Service Card.) Abbeon Supply Co.

Use the Reader Service Cards on pages 35-36 and 165-166 to ask for more information on these products. Circle item numbers of products in which you are interested.



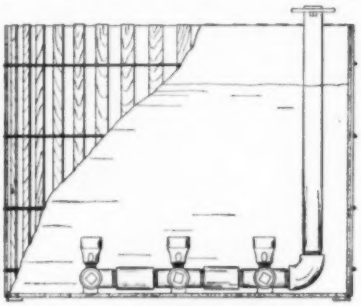
6—TRUCK ATTACHMENT for rapid fork adjustments

For fork truck users who must make frequent fork adjustments, yet maintain positive positioning, this new fork truck attachment is said to be the answer. The unit, known as "screw adjusting forks," is for use on manufacturer's complete line of gas and electric powered fork trucks. It consists of a frame which attaches to the standard load elevator and this frame supports a pair of large diameter screws with machine cut screw threads. The forks, in turn, are supported on these screws and can be moved laterally as the screws are turned, company explains, and this permits independent action of either fork. Handwheels or a detachable crank handle can be supplied to operate the screw. (For details circle No. 6 on Reader Service Card.) The Elwell-Parker Electric Co.

7—SPARGER NOZZLES for tank heating of liquids

SK Haveg Sparger Nozzles are said to resist the action of many chemicals and provide quick, uniform distribution of heat over a large volume of liquid. Simple in design, the nozzles are made of Haveg 60, a molded product resistant to acids, salts and solvents. (They can also be made of Haveg 41.)

These nozzles were developed to overcome costly replacement of sparger pipe used to heat tank liquids.



Previously, holes were drilled in the sparger pipe, company explains, but constant high velocity steam pressure often caused such holes to wear badly, necessitating removal of the entire pipe. This isn't necessary with these new nozzles, it is pointed out; when wear affects their efficiency, a new nozzle is threaded to the pipe.

To install them, the steam line is male pipe thread on the nozzle—or the drilled and tapped to take the ½ in.

$12.65 on the shelf... $32.45 in the line

Like most installations, a pipe line is part materials and part labor. And the labor part has been getting bigger and bigger.

This growing labor cost is no small consideration when buying piping equipment. It costs just as much to install an inferior valve as a good one. And it costs a lot more to service the inferior one. For a single item, that difference might not be significant. But single items don't make a piping system. Instead, you may use and have to maintain hundreds, even thousands of individual valves.

Simple arithmetic tells why today it's more important than ever to buy valves that last longer and need fewer repairs. That's why Crane quality makes Crane the line for the thrifty buyer... it's why more Crane Valves are in use than any other make.

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CRANE

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more facts circle 574 on Reply Card

NEW PRODUCTS

(Begins on page 126)

nozzle can be cemented in place. (For complete data on these sparger nozzles, including steam consumption and heating capacity, circle No. 7 on Reader Service Card.) Schutte & Koerting Co.

8—INSULATING PUTTY comes in roll, applies like tape

Scotchfil is an electrical insulating compound packaged in rolls 1½-in. wide, 5 ft. long. The black, 1/8 in. thick material fuses into a mass after application and is designed not only to insulate, but also to pad sharp edges on bus bars, build up cable splices and fill voids around irregular-shaped connectors prior to taping.

Since it comes in roll form, you use

only as much as you need for the job—the rest of the roll is protected by a disposable liner. Strip this liner off, mold the putty in place with your fingers and you have a smooth, non-sticky surface ready for taping. Scotchfil is designed for use with company's plastic electrical tapes Nos. 22 and 33. Aging characteristics are described as excellent and company says the putty won't dry out or get brittle. (For brochure of technical data circle No. 8 on Reader Service Card.) Minnesota Mining & Mfg. Co.

9—PULLER SET for tough industrial maintenance jobs

This set was developed especially for industrial pulling and installing operations involving removal and installation of gears, bearings, pulleys, wheels, pinions and shafts on machine tools, turbines, etc. The set includes company's new 50-ton Power-Twin hydraulic unit to provide the power, together with suitable pullers and attachments. A three-speed hand pump or an electrically driven pump is also available for use with this set. (For complete details circle No. 9 on Reader Service Card.) Owatonna Tool Co.

10—DEGREASER is a low cost, semi-portable unit

The new VS Jr Degreaser is designed to clean small and medium parts and is described as well suited for shops and small plants where up to 600 lb of steel per hour must be degreased. Two standard manually operated models are available — one is electrically heated, the other operates by steam. Both may be relocated at any time in any work area offering service facilities.

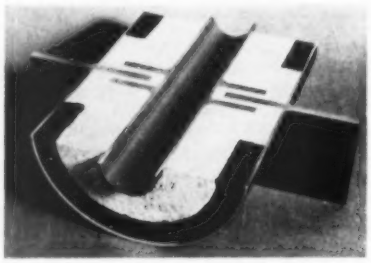
In the VS Jr, parts are suspended in solvent vapor to dissolve dirt and grease, then a spray of hot solvent flushes away stubborn soils, and finally a rinse in solvent vapor is provided to leave the work clean and dry. Work may be placed in baskets or on racks or hooks and may be carried in and out of the degreaser by hand or by small hoist. Described as economical to buy, operate and maintain, the equipment is only 48 in. from top to base. It has a non-porous interior coating said to be corrosion proof and unaffected by degreasing solvents. (For further details circle No. 10 on Reader Service Card.) Detrex Corp.

11—SUMP PUMP has discharge capacity up to 3050 gph

Suggested for draining pits, boiler rooms, sub-basements, elevator shafts and similar areas, this vertical centrifugal pump features all bronze construction, and stainless steel shaft. The ball-shaped base and strainer are designed to protect the pump from clogging, and the strainer can be cleaned without removing the pump from its sump. The standard NEMA 1/3 hp continuous duty induction type motor has built-in overload protection and rubber covered 8 ft cord and plug. Plastic weights which operate the switch can be adjusted to liquid operating level. (For details circle No. 11 on Reader Service Card.) F. E. Myers & Bro. Co.

12—ANCHOR designed for underground insulated pipe

This new type of insulated pipe anchor, for underground insulated systems conveying hot or cold liquids or gases, is so constructed that contact is eliminated between anchor plate and pipe. The plate is insulated from the pipeline both thermally and electrically by



a non-compressible block of Transite sheet material, it is pointed out, and the design and materials serve to minimize heat loss at anchorage points and prevent pipeline corrosion by electrolytic action. (For technical details circle No. 12 on Reader Service Card.) Durant Insulated Pipe Co.

13—STEAM HOSE is made of braided wire, glass cord

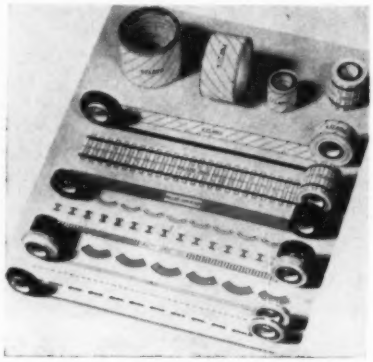
Ironsides Steam Hose was especially developed for the finishing work found in steel mills, refineries, glass factories, foundries and in all types of steam cleaning. Its inner braids of wire give the hose high burst resistance, company explains, and the glass cord outer braid provides extra strength as well as a higher degree of insulation. Both tube and cover are of heavy gage Ebonite heat resistant compound.

Described as flexible and kinkproof, Ironsides Steam Hose is designed for working pressures to 200 lb. Sizes range from ½ to 1¼ in. ID. (For further details, circle No. 13 on Reader Service Card.) Quaker Rubber Corp., Div. H. K. Porter Co., Inc.

14—PRINTED TAPE saves time in layout planning

This pressure-sensitive "layout" tape eliminates initial drawing of repetitive symbols and lets you change temporary layouts quickly by stripping the tape from its original position and placing it wherever wanted.

Standard symbols for walls, aisles, conveyors, monorails, center lines, columns, shafts, stairways, railroad tracks, sidings, arrows for material and process flow, etc., are available in 9- and 18-yd



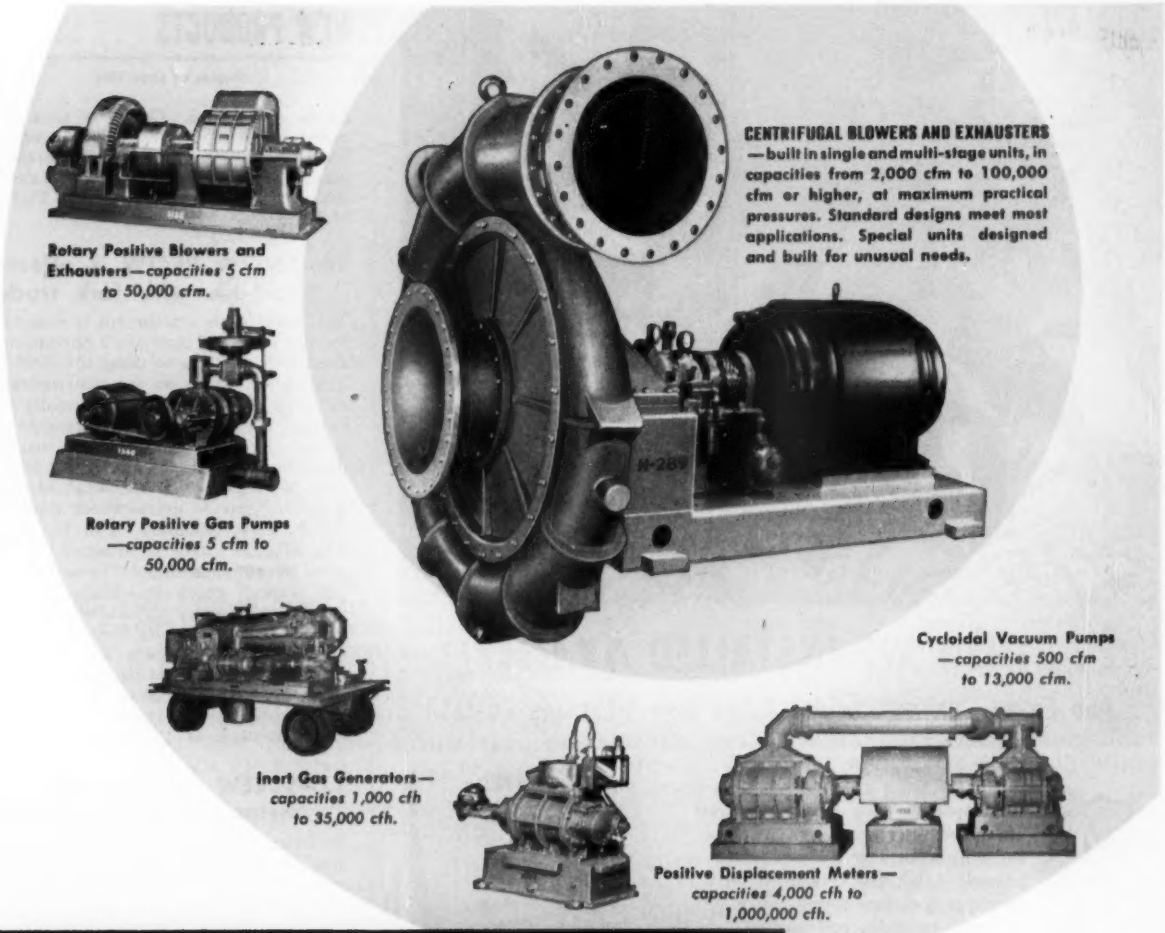
rolls, scale ¼ in. to 1 ft. Opaque types may be had for photo-copying; transparent types for reproduction on standard ammonia vapor machines. A representative selection of 15 symbols and 20 different rolls may be had in kit form with cutting knife and instructions. Or you may make your own selection from the complete list of 45 symbols, colors and tapes. (For details circle No. 14 on Reader Service Card.) Labelon Tape Co., Inc.

15—COFFEE SERVER pours 100 cups, black or "with"

The compact little Coffee Cub is an automatic hot coffee server no bigger than an office-type water cooler but built to serve 100 individual cups of hot coffee without refilling. Ingredients used are a liquid coffee concentrate and hot water, and if "ordered," fresh cream and liquid cane sugar.

To get a cup, you select the kind you want (black or with trimmings), drop in a coin (or flip a switch) and down pops a paper cup and out pours the coffee.

The unit is made of steel and contains a refrigeration unit for the concentrate, cream and sugar, a heat generating element for the hot water. Size of this dispenser makes it practical for small plants, individual plant depart-


Rotary Positive Blowers and Exhausters—capacities 5 cfm to 50,000 cfm.
CENTRIFUGAL BLOWERS AND EXHAUSTERS —built in single and multi-stage units, in capacities from 2,000 cfm to 100,000 cfm or higher, at maximum practical pressures. Standard designs meet most applications. Special units designed and built for unusual needs.
Rotary Positive Gas Pumps —capacities 5 cfm to 50,000 cfm.
Cycloidal Vacuum Pumps —capacities 500 cfm to 13,000 cfm.
Inert Gas Generators— capacities 1,000 cfh to 35,000 cfh.
Positive Displacement Meters— capacities 4,000 cfh to 1,000,000 cfh.

WE *Specialize* IN YOUR PROBLEMS OF MOVING GAS OR AIR!

Your business probably *is* different when it comes to handling gas or air. You may want to move a thimbleful of gas—or create a cyclone of whirling air. But, no matter how your problem differs from your neighbor's, the chances are that we've met something pretty close to it, in our almost a century of experience of building such equipment.

Another reason why we know so much about this job is that it's all we do. Our customers range from the "giants of industry" to the neighborhood plant, both of whose production depends upon continuous, reliable, economical performance of air and gas handling units. Because we build the exclusive *dual-ability line* of Rotary Positive and Centrifugal Units, in a wide range of sizes, we offer a *dual choice* not available from any other maker—which permits completely unbiased recommendations.

So—if you have a problem today—or anticipate one a year or five years from now, we suggest you call upon the R-C Specialists—to give you a long-time, satisfactory answer. Write for bulletins on any specific equipment.

ROOTS-CONNERSVILLE

Exclusive Specialists in Handling Gas and Air

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. . . THEN WE INSTALLED ALGRIP

And Ended Slipping Accidents And High Insurance Costs!

It happened at a large industrial plant, where oil and grease on a loading platform created a constant hazard. A lift truck skidded on the slippery surface, toppled from the platform's edge, and crushed the operator to death.

ELIMINATED: Accidents like this—which cost a man his life.

SAVED: $20,000 in Additional Compensation Premiums.

Then A.W. ALGRIP Abrasive Rolled Steel Floor Plate was installed on the platform—and slipping accidents ended at once. For ALGRIP is truly non-slip—even on steep inclines! Hundreds of tiny abrasive particles in each square foot of ALGRIP converted the slippery, dangerous platform into a hard gripping, anti-skid surface—safe for men and vehicles alike.

IMMEDIATE SAVINGS were obtained in three ways: (1) *No more costly, morale shattering accidents.* (2) *Faster handling of loads.* (3) *Workmen's compensation insurance premiums were substantially reduced by more than enough to pay for the* ALGRIP *installation.*

END SLIPPING ACCIDENTS THAT STEAL PRODUCTION AND KITE INSURANCE RATES

A.W. ALGRIP—only abrasive rolled steel floor plate in the world—pays for itself in savings from safety. Tough abrasive particles (same kind used in grinding wheels) put hundreds of tiny safety-brakes in every footstep—make it virtually impossible to slip even on steep inclines. ALGRIP doesn't wear smooth either—wear only exposes new particles. And tough rolled steel makes this floor plate stronger than other abrasive floorings. For safety at a saving, get the full ALGRIP story today. Write for our new Booklet AL-71—without obligation.

Over 125 Years of Iron and Steel Making Experience.

ALGRIP Abrasive Rolled Steel Floor Plate

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN, PA.

Other Products: A. W. SUPER-DIAMOND Floor Plate • Plates • Sheet • Strip (Alloy and Special Grades)

For more facts circle 576 on Reply Card

NEW PRODUCTS

(Begins on page 126)

ments and offices. Company says the coffee will cost 5 to 10 cents a cup to serve—depending on local operating costs. (For more information, circle No. 15 on Reader Service Card). Rudd-Melikan, Inc.

16—SNOW PLOW is offered for use with fork trucks

This snow plow attachment is designed for use on all of company's pneumatic-tired fork trucks excepting the 1000-lb Trucloader. The plow is a non-hydraulic attachment adjusted manually to several blade angles and adaptable to uneven ground surfaces. The ballast box, mounted directly over truck forks, may be loaded with any kind of material to provide drive-wheel traction.

The blade assembly, 3/16 in. thick and 23½ in. high, is attached to the plow mounting assembly by a vertical pin around which the blade may be rotated for angle adjustment. Company says the plow is readily detachable as a unit, needs no tools for mounting or dismounting. (For detailed literature circle No. 16 on Reader Service Card.) Industrial Truck Div., Clark Equipment Co.

17—SCREW CALCULATOR helps you get correct size

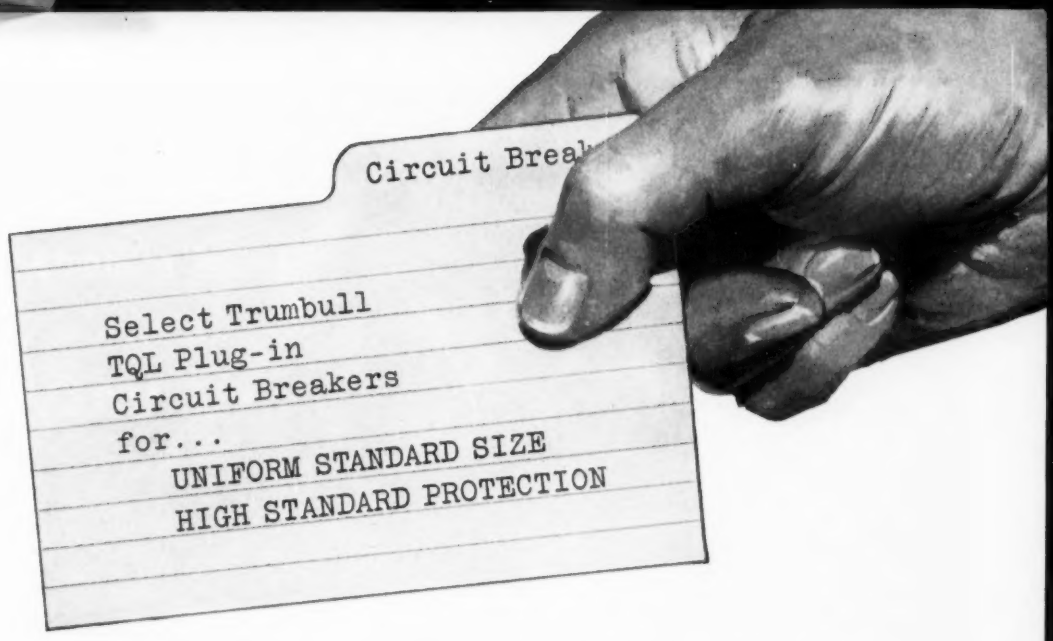
To help plant engineers find the right size socket screws in a hurry, this manufacturer offers a plastic slide-type calculator. With it, all dimensions can be found for a standard screw of a given diameter. Threads per inch, proper tap drill size in National Coarse and Fine Series and body drill and counter-bore sizes are given for each diameter. Calculator also gives vital dimensions on threaded items among company's products, including socket head cap screws, hollow set screws, flat head socket cap screws, socket head shoulder screws and others.

Plant engineers may have this handy little calculator without charge. (To get yours, circle No. 17 on Reader Service Card.) Standard Pressed Steel Co.

18—SURFACING MATERIAL for old, worn asphalt roofs

Corotop is offered for fast, economical maintenance of asphalt roofs—to provide a new heavy-duty weather-tight surface for old and worn roofs. The product is a combination of non-rotting Fiberglas roofing mat and liquid asphalt and is applied cold by brush or spray. Application is a three-step process which follows minimum cleaning and patching of the old roof. It's a fast process, according to company—a four man crew can lay as much as 40,000 sq ft of Corotop a day.

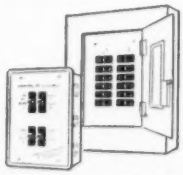
The mat weighs only 2 lb per square of 100 sq ft and comes in rolls, each weighing 11 lb and covering 5½ squares. The liquid, basically a clay type emulsion, is available in 55 gal drums. Com-



Trumbull TQL Plug-in Breakers from 10 through 50 amp. ratings are all made to the same standard dimensions — physically interchangeable not only in Trumbull Load Centers and Panelboards but also dimensions of these breakers have been adopted by leading manufacturers. This means convenience, economy and time saving for the contractor or plant electrician.

Trumbull also sets the quality and safety standard with a thermal-magnetic trip for positive protection against both shorts and sustained overloads. Compact and economical to buy and install. They pay for themselves because they are built to last a lifetime. They pay big dividends in letting you restore service quickly after short or overload is corrected. They may well save a capital investment by prevention of overheated circuits.

Quick Facts

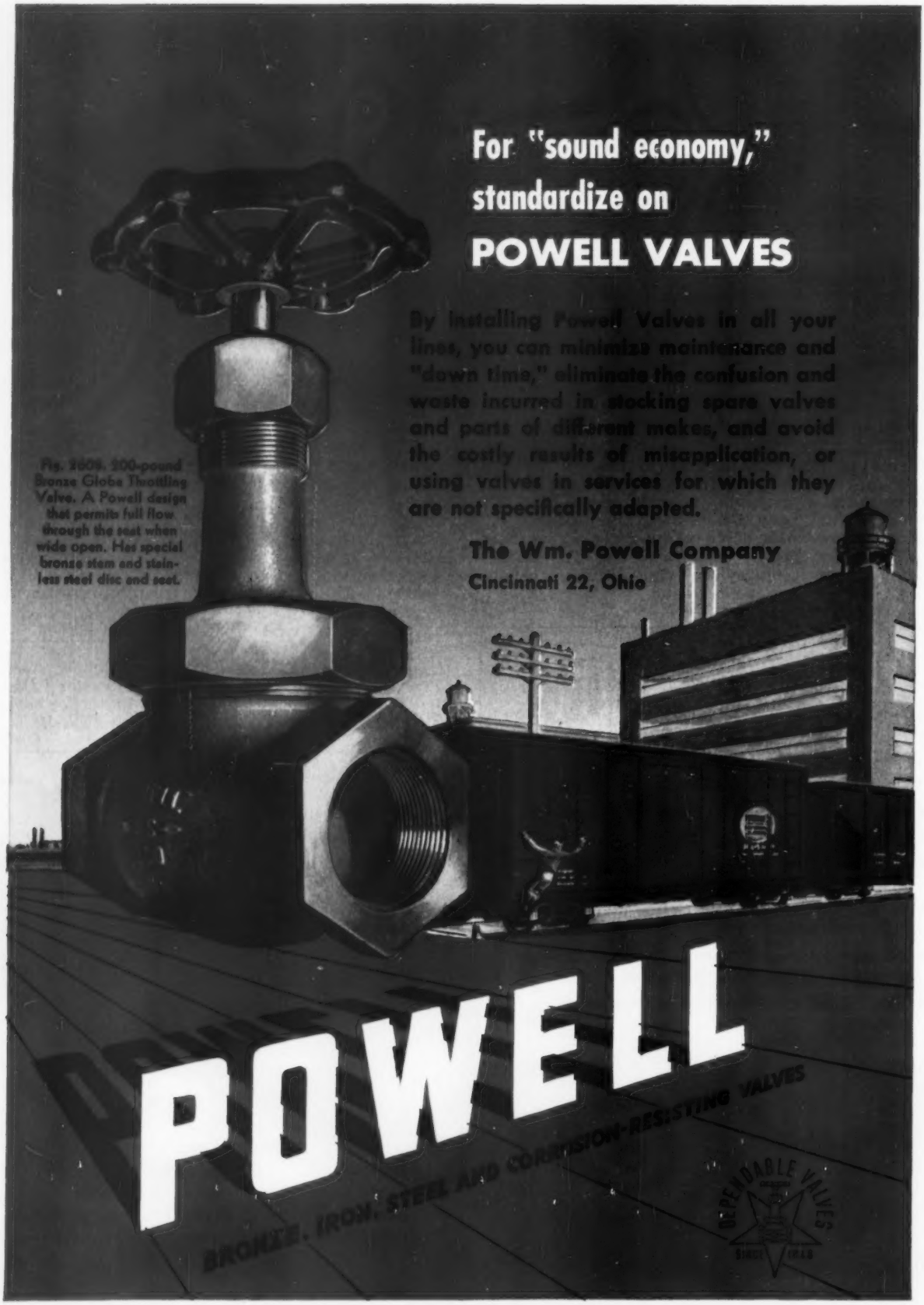


- Quick-make, Quick-break
- Trip indicating, trip free handle, with stamped rating
- Positive arc-quenching and extended exhaust chamber
- Tamperproof, sealed factory calibration
- Double pole operation with handle extensions
- Underwriters' Laboratories Approved for feeding through line or load terminal
- Ratings: 10, 15, 20, 30, 40 and 50 amp., 120 volt A.C., single pole
- Interrupting ratings: 5000 amp., 120 volt A.C., single pole; 120/240 volt A.C., double pole
- Size: 2-27/32 x 31/32 x 2-15/16 (over handle)

Leading Electrical Distributors everywhere stock Trumbull equipment. See your local Trumbull Distributor for top values and alert service. For complete descriptive literature, write for TEB-12.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.


For "sound economy," standardize on
POWELL VALVES
By installing Powell Valves in all your lines, you can minimize maintenance and "down time," eliminate the confusion and waste incurred in stocking spare valves and parts of different makes, and avoid the costly results of misapplication, or using valves in services for which they are not specifically adapted.
The Wm. Powell Company
Cincinnati 22, Ohio
Fig. 2608. 200-pound Bronze Globe Throttling Valve. A Powell design that permits full flow through the seat when wide open. Has special bronze stem and stainless steel disc and seat.
POWELL
BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES
DEPENDABLE VALVES
SINCE 1842
For more facts circle 578 on Reply Card

NEW PRODUCTS

(Begins on page 126)

pany says that Corotop will adhere to damp or dry, flat or vertical surfaces and will cling to brick, masonry, metal or wood as well as composition roofing. (For more details on Corotop and how to apply it circle No. 18 on Reader Service Card.) Owens-Corning Fiberglas Corp.

19—RUBBER HOSE for high pressure industrial uses

Wiretex is said to offer strength, flexibility, oil and abrasion resistance, plus the ability to withstand effects of high and low temperatures. Wiretex is made with a mandrel cured, Reprene tube in lengths up to 60 ft. The tube is

reinforced with a textile carcass continuously braided around the tube in multiple rubber-impregnated plies, or with alternating plies or braided fabrics and braided wires, or with multiple braids of standard or extra heavy wire. Thick rubber or braided textile covers encase the hose carcasses.

Designed to withstand working pressures to 5500 psi and temperatures from -40 to 200 F, Wiretex comes in standard sizes from 3/16 to 2 in. for hydraulic control hose. (For details circle No. 19 on Reader Service Card.) Republic Rubber Div., Lee Rubber & Tire Corp.

20—TRAILER teams up with fork truck for hauling

In modern, one-story structures, where handling operations involve longer horizontal travel, the use of trailer trains teamed with fork trucks is becoming increasingly popular. Trailers of the FloorMaster Type Q line are made without the use of bolts, of kiln-dried double-tongue and groove maple and are intended for rugged duty. Main wheels are mounted on a rigid A frame unit hanger to eliminate side sway without strain on floating hardwood deck. Double ball race plate type casters are used at the front to assure ease of swiveling. Rubber-tired or molded plastic celeron trailer wheels are available, all with roller bearings.

Floormasters are made in a variety of sizes in capacities from 1000 to 4000 lb. (For more information circle No. 20 on Reader Service Card.) Lewis-Shepard Products, Inc.

21—SURFACING MATERIAL is trowelled on walls, floors

Ceilcrete, a new troweled-on surfacing material, bids to become a popular substitute for acid proof brick. Ceilcrete is a combination of synthetic liquid resin, inert fillers and pigments and cures into a hard, dense surface. This stone-like surface is said to withstand

Koiled Kords*

BEFORE

eliminate wire jungles

AFTER

and increase efficiency

*TRADEMARK

"Before and after" pictures courtesy the Miller Company, Meriden, Conn.

Get rid of that tangled, jumbled jungle of inefficient wiring on electrical tools that move. Use Koiled Kords in the plant or on your products and increase efficiency, minimize accident hazards and cut replacement costs.

Koiled Kords are neoprene jacketed electric cords of high quality that are permanently coiled into a spring-like shape which provides for extension and retraction.

Koiled Kords are made with from one to six conductors and may be purchased in mandrel lengths four feet long and used just like straight cords are used. When required Koiled Kords are made to customers' specifications in combination of coiled and straight lengths with or without terminals.

For specific information for your own application of Koiled Kords write in full detail. Koiled Kords will be glad to work with you.

SEE US AT THE PLANT MAINTENANCE SHOW
BOOTH 1525

Koiled Kords
INCORPORATED

BOX K, HAMDEN, CONN.

IN CANADA: R. D. FLECK AND COMPANY LIMITED, OSHAWA, ONT.

For more facts circle 579 on Reply Card

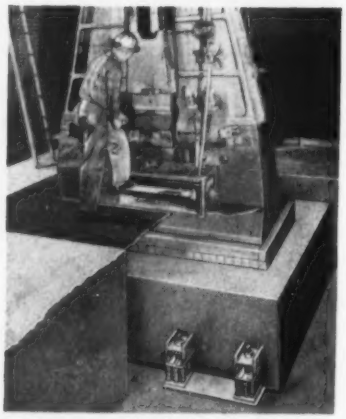
STOP VIBRATION

WITH

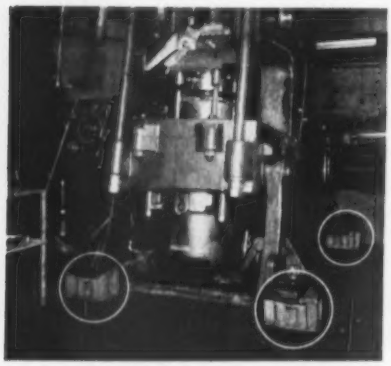
KORFUND VIBRATION CONTROL

Reducing transmitted vibration and dynamic loads with Korfund Vibration Control gives:

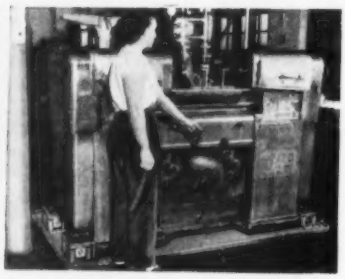
- **More efficient plant layout**
- **Elimination of special foundations for most machines**
- **Reduced rejects—improved work quality**
- **Increased production**
- **Reduced maintenance**
- **Reduced noise and employee fatigue**



Typical spring-isolated hammer foundation. Shock isolation is so complete that a coin will remain standing on edge beside the foundation as maximum blows are struck. Tests prove there is actually a slight increase in hammer blow efficiency.



Korfund Vibro-Isolators solved a serious vibration problem, and permitted installation of this 100 ton press on a weak upper floor in a loft building. Isolators often permit higher press speeds for greater production.



Today's precision machine tools pay off in high production to close tolerances when protected from external disturbances. Special foundations can often be eliminated with economcial vibration control.

Vibration and shock transmission can be stopped at the source by mounting impact machinery such as hammers and punch presses, and mechanical equipment such as pumps and compressors on Korfund Vibro-Isolators. Accuracy of precision machines such as grinders, borematics and jig borers can be protected against external vibration with Korfund machine tool mountings. Furnace arch and globar life can be more than doubled with protective Korfund furnace mountings.

Installation is simplified by means of Korfund Vibration Control for most machines because they can be installed on ordinary floors without special foundations. Furthermore, better equipment layout gives straight-line work flow for higher production.

Standard Korfund Isolators are available for most applications. A Selector Chart in bulletin G-105 gives recommendations for both normal and critical conditions, for hammers, machine tools, pumps, compressors, fans and most other mechanical equipment. See Sweet's Catalog Files or write us for your free copy today.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you will find in most principal cities. A half century of experience is at your disposal.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

THE KORFUND COMPANY, INC.

48-35R Thirty-Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

See us at the Plant Maintenance Show, Cleveland, January 19-22, Booth No. 610.

For more facts circle 580 on Reply Card

NEW PRODUCTS

(Begins on page 126)

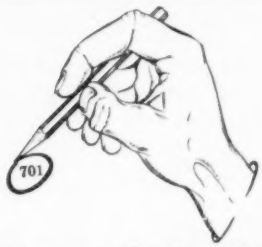
trucking, foot traffic, and abrasion, to be corrosion proof, and to have a rated load carrying strength much greater than that of dense concrete.

Greatest usefulness of Ceilcrete is seen in its application to walls, floors and tanks subject to corrosive liquids or atmospheres. Manufacturer says it resists solvents, acids and alkalis, is non-sparking and non-slip. The material is usually applied in a single layer 1/8 in. thick. It comes in black and colors. (Circle No. 21 on Reader Service Card.) Ceilcote Co.

22—CONTROL VALVE handles any light fluid medium

A new three-way solenoid controlled and pilot operated valve, the Model 1034 is designed to control air, water and light oils. Its design provides a pressure range of from 20 to 500 psi for either normally open or normally closed service. Three-way pilot valve, partially housed in the main valve piston, makes a compact unit, and minimum travel of moving parts assures fast valve action. All valves may be cycled continuously up to 600 c/m for the smaller sizes.

Cast iron valve bodies have three threaded connections corresponding with nominal port sizes of ¼, ⅜, ½ and ¾ in. (Circle No. 22 on Reader Service Card.) Barksdale Valves.

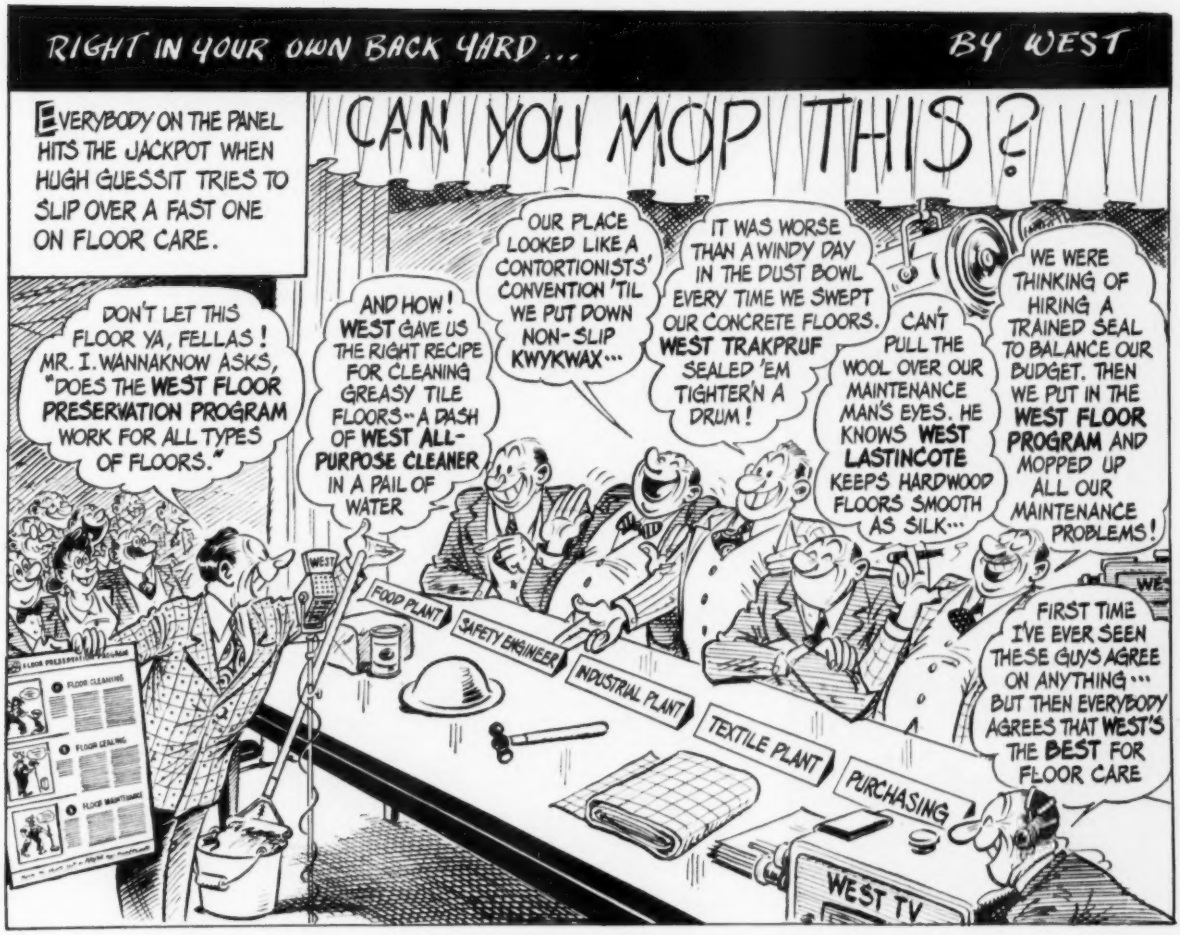


It's easy to obtain product data with the postage-free Reader Service Cards on pages 35-36 and 165-166. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

23—CHEMICAL FEED SYSTEM is compact packaged unit

This package utilizes the basic elements of a chemical feed system to reduce piping and offer considerable savings in installation time and space, manufacturer announces. The units consists of a 50-to-500-gal carbon steel chemical solution tank mounted over a controlled volume pump. Piping is supplied for the suction line, complete with valves and sight gage for reading liquid level. Accessory equipment,

(Continued on page 142)


RIGHT IN YOUR OWN BACK YARD...
BY WEST
EVERYBODY ON THE PANEL HITS THE JACKPOT WHEN HUGH GUESSIT TRIES TO SLIP OVER A FAST ONE ON FLOOR CARE.
CAN YOU MOP THIS?
DON'T LET THIS FLOOR YA, FELLAS! MR. I. WANNAKNOW ASKS, "DOES THE WEST FLOOR PRESERVATION PROGRAM WORK FOR ALL TYPES OF FLOORS."
AND HOW! WEST GAVE US THE RIGHT RECIPE FOR CLEANING GREASY TILE FLOORS--A DASH OF WEST ALL-PURPOSE CLEANER IN A PAIL OF WATER
OUR PLACE LOOKED LIKE A CONTORTIONISTS' CONVENTION 'TIL WE PUT DOWN NON-SLIP KWYKWAX...
IT WAS WORSE THAN A WINDY DAY IN THE DUST BOWL EVERY TIME WE SWEPT OUR CONCRETE FLOORS. WEST TRAKPRUF SEALED 'EM TIGHTER'N A DRUM!
CAN'T PULL THE WOOL OVER OUR MAINTENANCE MAN'S EYES. HE KNOWS WEST LASTINCOTE KEEPS HARDWOOD FLOORS SMOOTH AS SILK...
WE WERE THINKING OF HIRING A TRAINED SEAL TO BALANCE OUR BUDGET. THEN WE PUT IN THE WEST FLOOR PROGRAM AND MOPPED UP ALL OUR MAINTENANCE PROBLEMS!
FIRST TIME I'VE EVER SEEN THESE GUYS AGREE ON ANYTHING... BUT THEN EVERYBODY AGREES THAT WEST'S THE BEST FOR FLOOR CARE
FOOD PLANT
SAFETY ENGINEER
INDUSTRIAL PLANT
TEXTILE PLANT
PURCHASING
WEST TV

New floors cost $300,000,000 *a year!*

TYPE OF FLOOR	INSTALLED COST* OF 50,000 SQ. FT.
Asphalt Tile	$15,000
Concrete	18,000
Linoleum	21,000
Hardwood	27,500
Cork	39,000
Rubber Tile	44,000
Vinyl Tile	44,000
Ceramic Tile	65,000
Terrazzo & Mosaic	87,500
Marble	300,000

*Based on reports of reliable flooring contractors in urban areas.

How much will it cost you to replace worn-out floors today? The chart gives you some idea.

But, your floors *don't have* to wear out. They can be protected almost indefinitely.

How? With West's simple, proven FLOOR PRESERVATION PLAN. (1) *Cleaning* — remove all dirt without harming floors (2) *Sealing* — fill the pores. Provide a protective coating (3) *Maintaining* — put on a tough, anti-slip floor wax.

The West Plan offers you more than 20 proven products. A West Floor Specialist will be glad to help you select the program or product you need.

WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.

Visit us at the PLANT MAINTENANCE SHOW — CLEVELAND Jan. 19-22 Booth #501

Please send FREE booklet "Proper Care of Floors"

DEPT. 52

Name_____ Title_____

Company_____

Address_____

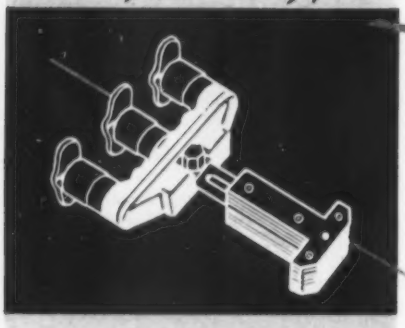
City_____ Zone____ State_____

For more facts circle 581 on Reply Card

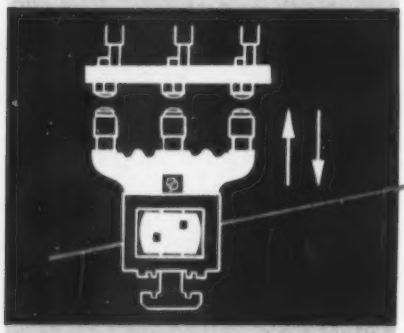
Simplicity

—the key to the Leadership Position of ALLEN-BRADLEY SOLENOID STARTERS

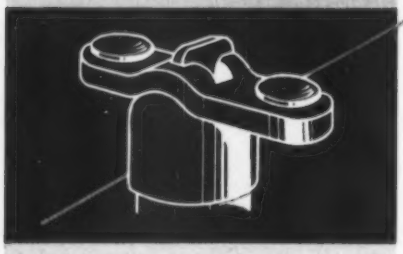
Simple Design— only one moving part

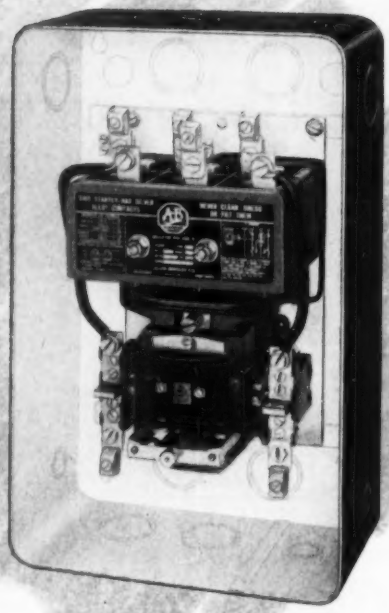


Reliable Solenoid Motion



Maintenance Free Contacts





● Simple design—only ONE moving part. Allen-Bradley Bulletin 709 automatic starters are trouble free because they have no pivots, pins, bearings, intricate linkage, or flexible shunts. Also, the reliable straight up and down solenoid motion is frictionless. Obviously, the more parts the more chances for trouble. Simplicity of design is the first requirement of a dependable motor starter.

The simple solenoid action . . . enclosed arc hoods—which make for a compact unit . . . maintenance free, dependable double break silver alloy contacts . . . bright white cabinet interior with bonderized finish are outstanding plus features that you secure at no added cost when you purchase an Allen-Bradley solenoid starter.

Allen-Bradley Co., 1317 S. First St., Milwaukee 4, Wis.

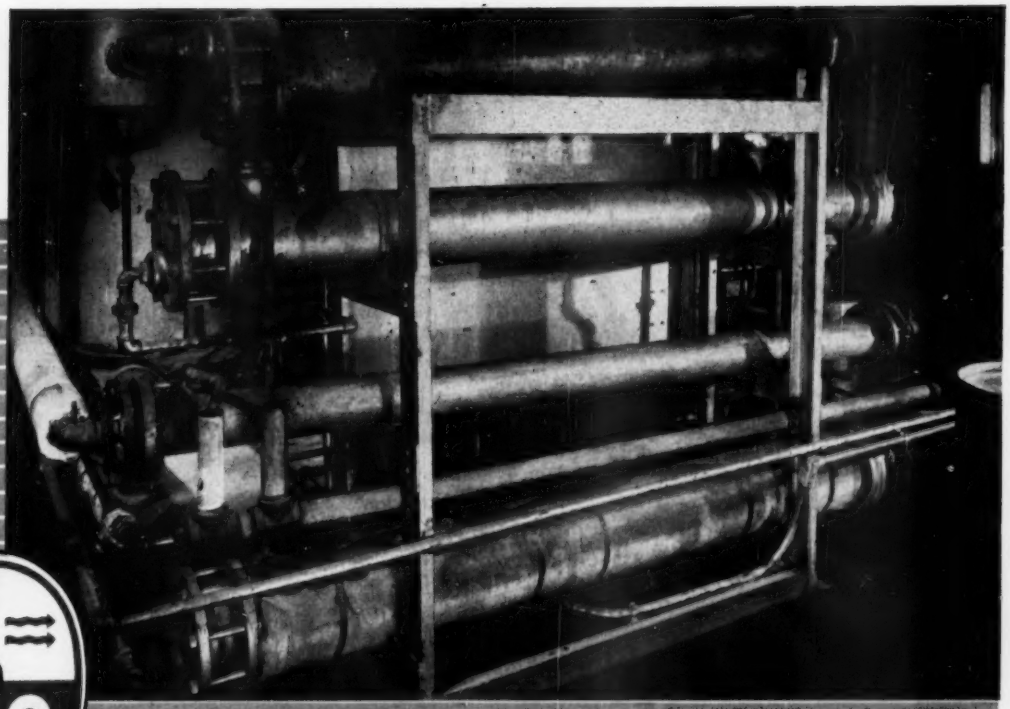
ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

A-B Quality

For more facts circle 582 on Reply Card



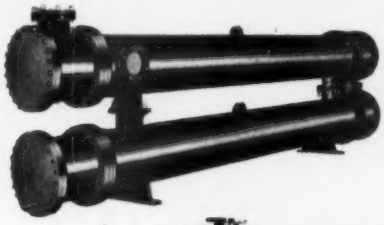
Battery of B&G Gas and Liquid Coolers

Hydro-Flo HEAT EXCHANGERS

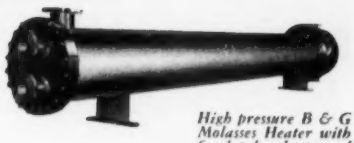
Standard Design or built to your specifications

B & G *Hydro-Flo* Heat Exchangers are made in so wide a capacity and utility range that many requirements can be satisfied with standard units. If, however, special designs or materials are necessary, B & G equipment can be built to your specifications. The B & G engineering staff is always ready to assist in every way possible.

Whether standard or special, you'll find that B & G Heat Exchangers will meet your most critical appraisal. Sound design, backed by painstaking workmanship and rigid inspection assure equipment of top efficiency and long life. *B & G Hydro-Flo Products deliver more value per dollar because they are built that way!*



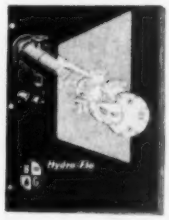
Two single pass, channel head B & G Heat Exchangers for series operation.



High pressure B & G Molasses Heater with fixed tube sheets and expansion joint design.

B&G Hydro-Flo shell-and-tube heat exchangers are available in the following types:

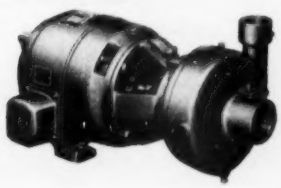
Straight and "U" Bend Tube Heat Exchangers • Fuel Oil Preheaters • Tank Suction Heaters • Aftercoolers • Gas Coolers • Water Heaters • Refrigeration Condensers and Evaporators.



SEND FOR CATALOG DM-1150

B & G CENTRIFUGAL PUMPS

Complete line for application in process industries and refrigeration and air conditioning installations. Send for catalogs.



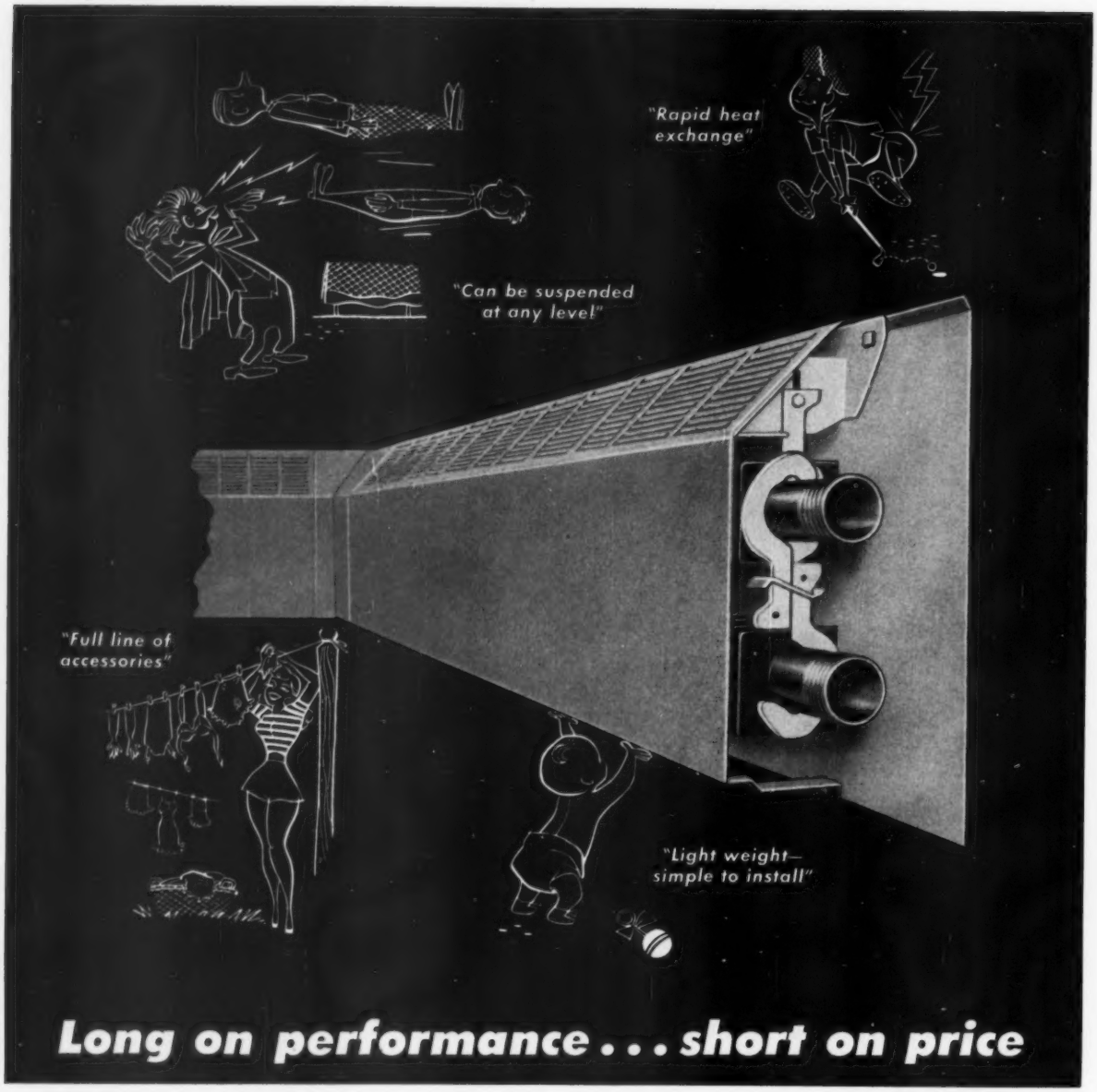
BELL & GOSSETT COMPANY

Dept. CU-53, Morton Grove, Ill.

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto, Canada

* Reg. U. S. Pat. Off.

For more facts circle 583 on Reply Card



Long on performance . . . short on price

For low-cost, along-the-wall radiation that looks good *anywhere* —be sure to look at Dunham's new Fin-Vector Radiation.

Three attractive cover designs, plus a complete line of accessories, give the new Fin-Vector a tight, trim, "finished" appearance . . . suitable for any surroundings.

Fin-Vector transfers heat rapidly, operates efficiently at any height above 4" from the floor. Installation costs are low since Fin-Vector goes in so fast, requires few supports, or little on-the-job cutting. Write for full details.

Send For Free Bulletin

Data sheets 1256-61 fully describe and illustrate design and construction features. For your free copies write to: C. A. Dunham Company, Dept. 20, 400 W. Madison Street, Chicago 6, Ill.

DUNHAM **FIN-VECTOR RADIATION**

ANOTHER QUALITY PRODUCT OF C. A. DUNHAM COMPANY—CHICAGO • TORONTO • LONDON

For more facts circle 584 on Reply Card

It's ready NOW!

Yale's new Warehouser

Here's the narrow aisle straddle-type truck you've waited for... more efficient—far safer—thanks to new improved YALE design.

ELECTRIC POWER—and power to spare! There's almost no warehouse job that can't be done more efficiently and at lower cost with one man and the remarkable, trouble-free YALE Warehouser.

SHORTER LENGTH AND ROUNDED REAR END allows right-angle tiering in aisles 6′ wide or less...doubling, tripling your present storage facilities without a cent of costly construction or remodeling.

LIGHTER WEIGHT—The YALE Warehouser is perfect for use over low-load capacity flooring...in elevators and on ramps...any place in older, unreinforced buildings.

SAFER SCIENTIFIC DESIGN places controls in center of truck for driver protection...provides a single hydraulic lifting cylinder for far better visibility ...gives never-failing "Dead Man" control that applies brakes and shuts off power the instant operator leaves truck.

Yes, the YALE Warehouser is the practical, money-saving answer to your modernization program. If you are considering new construction or the remodeling of your present storage facilities, consult with YALE...learn how this new, improved truck can help you get more use from every square unit of storage space.

MAIL THIS COUPON TODAY

The YALE & TOWNE Manufacturing Co., Dept. 471
Roosevelt Blvd. and Haldeman Ave., Phila. 15, Pa.
Please have your local representative call for an appointment.

Company _____ Title _____
Name _____ City _____ State _____
Street _____

In Canada write: The Yale & Towne Mfg. Co., Box 337—Postal Station "A"—Toronto

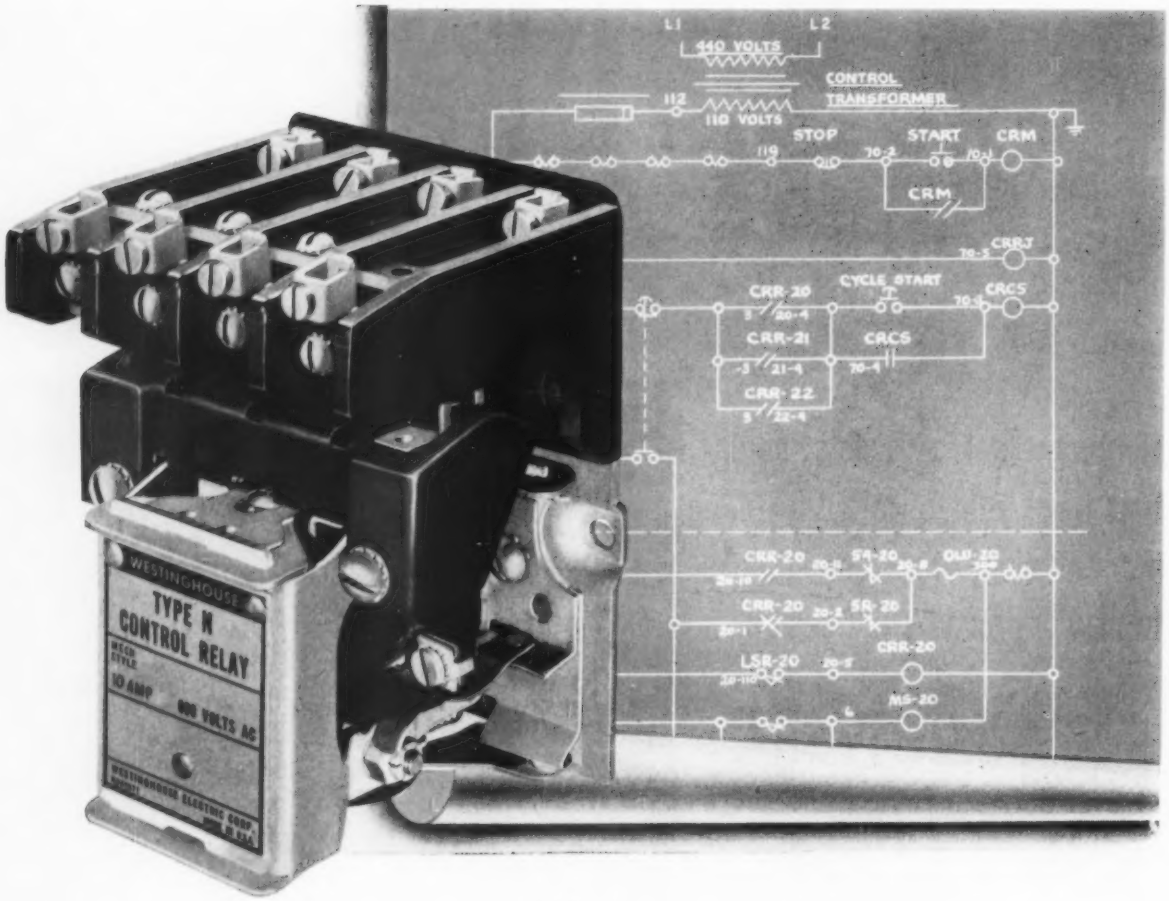
YALE*

MATERIALS HANDLING EQUIPMENT

*Registered trade mark

Gas and Electric Industrial Trucks • *Worksavers* • Hand Trucks • Hand and Electric Hoists • Pul-Lifts

For more facts circle 585 on Reply Card



NEW! TYPE N CONTROL RELAY

Rugged • Compact • Versatile

Designed into the new Westinghouse Type N Relay are all the outstanding features of the Life-Linestarter. Here are a few of many top advantages you get:

Knife-edge bearing for minimum wear

Kick-out spring for rapid, positive operation

Simplicity of design for longer life

The relay's compact design saves critical mounting area, whether in multiple-unit panels, in combination enclosures or singly in machinery.

Contacts may be easily converted from Normally Open to Normally Closed in the field.

The Type N Relay is rated 10 amperes (open), and is available in any pole combination up to 6 poles; can be supplied for any voltage up to 600 volts a-c and either open or in standard NEMA enclosures.

Westinghouse offers you a full line of control to handle competently the simplest or most complex control requirements.

Let us work with you. Call your Westinghouse Representative or write for B-5817. Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa. J-30130

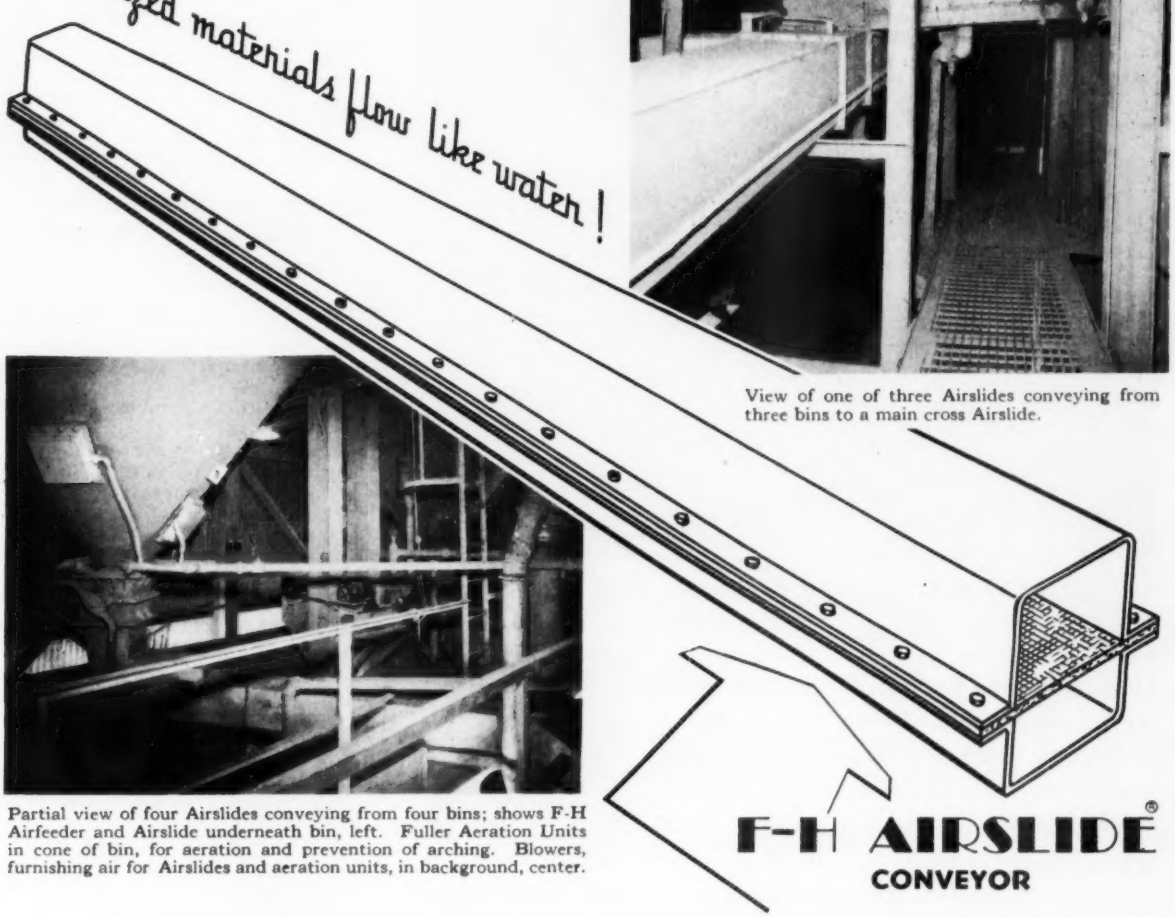
YOU CAN BE SURE...IF IT'S
Westinghouse
Life-Line CONTROL

For more facts circle 586 on Reply Card

Pulverized materials flow like water!

View of one of three Airslides conveying from three bins to a main cross Airslide.

Partial view of four Airslides conveying from four bins; shows F-H Airfeeder and Airslide underneath bin, left. Fuller Aeration Units in cone of bin, for aeration and prevention of arching. Blowers, furnishing air for Airslides and aeration units, in background, center.



F-H AIRSLIDE®
CONVEYOR

For sheer simplicity, low-maintenance costs and ease of operation, the F-H Airslide Conveyor is just about tops. In this system, dry, fine materials like gypsum, soda ash, fly ash, cement, barytes, flour, alumina, silica, talc, resins, detergents and soap powders are aerated and made to flow like water. Low-pressure air is dispersed through the material from a porous medium so that each particle is enveloped in air, thus reducing the interparticle friction and the angle of repose. Hence the material flows.

Think what this means to you? Because the system is completely enclosed, danger of contamination is removed . . . dusting eliminated. No moving parts, consequently repairs and costly down-time is at the minimum. Easily erected, a space-saver, the Airslide permits economy and convenience in location without the restrictions or straight-line limitations of mechanical conveyors.

Why not have a Fuller engineer show you how the Airslide can help cut your conveying costs . . . modernize your present plant equipment, or plan an entirely new system. Chances are he can show you how a minimum expenditure can bring you a conveying system that means low cost, reliable operation.

Fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS · COMPRESSORS AND VACUUM PUMPS · FEEDERS AND ASSOCIATED EQUIPMENT

FULLER COMPANY, Catasauqua, Pa.
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bldg.

FH-28

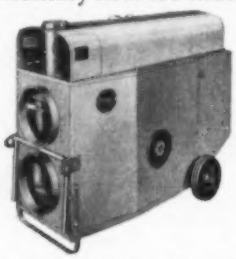
Fuller Company is the exclusive manufacturer of air gravity conveyors, except for use in motor vehicles, under Huron Portland Cement Company U. S. Patent Nos. 2,316,814, 2,517,837, 2,527,394, 2,527,455, 2,527,466, 2,527,488 and Patents Pending.

For more facts circle 587 on Reply Card

You can avoid layoffs, speed work in cold areas, protect perishable goods in a warehouse or provide supplementary heat for those extra cold days with safe, economical Herman Nelson Portable Heaters. Heat on wheels may enable you to continue operations during emergencies created by power failures or a breakdown of your regular heating system.

The only completely safe Portable Heater that uses flexible ducts to spot heat where most needed—and remember, only uncontaminated air heaters are absolutely safe!

Herman Nelson Portable Heaters are available in three models. Cost as little as $360. Easily moved and operated by one man.



HERMAN NELSON DELUXE I
Capacity 280,000-450,000 BTU/hr. Completely automatic, including temperature control. Fresh air delivery 2,000-2,350 cfm. Oil fired, electric powered. Other models available—with gasoline or electric power—and capacities from 125,000 to 385,000 BTU/hr.

Find out how to put portable heat to work for *you*. Mail this coupon today.

Herman Nelson Division, Dept. 85
American Air Filter Company, Inc., Moline, Illinois

Gentlemen: Please send information about Herman Nelson Portable Heaters; also my free copy of HEAT-ON-WHEELS FOR INDUSTRY.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 126)

such as low-level alarm panel and agitators, can also be supplied.

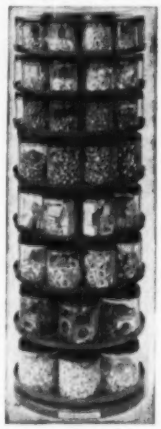
The controlled volume pumps are available in company's Simplex or Duplex models, air-powered or motor-driven, and are made in 10 types of metal for specific chemical services. Pump capacities range to 300 gph, operate against pressures to 5000 psi. (For data circle No. 23 on Reader Service Card.) Milton Roy Co.

24—WATERPROOF PAPER has absorbent reverse side

This disposable paper is absorbent on one side and waterproof on the other. It was originally developed for use in hospitals, but has since been found to have industrial applications, particularly in packaging. Called Lage Safe Mat, the paper is described as odorless, and non-rustling. The waterproof coating on one side is Geon polyvinyl chloride plastic latex. Company says it's equally strong, wet or dry. Several stock sizes are available, as well as rolls 36 in. wide and 300 ft long. (For information circle No. 24 on Reader Service Card.) B. F. Goodrich Co.

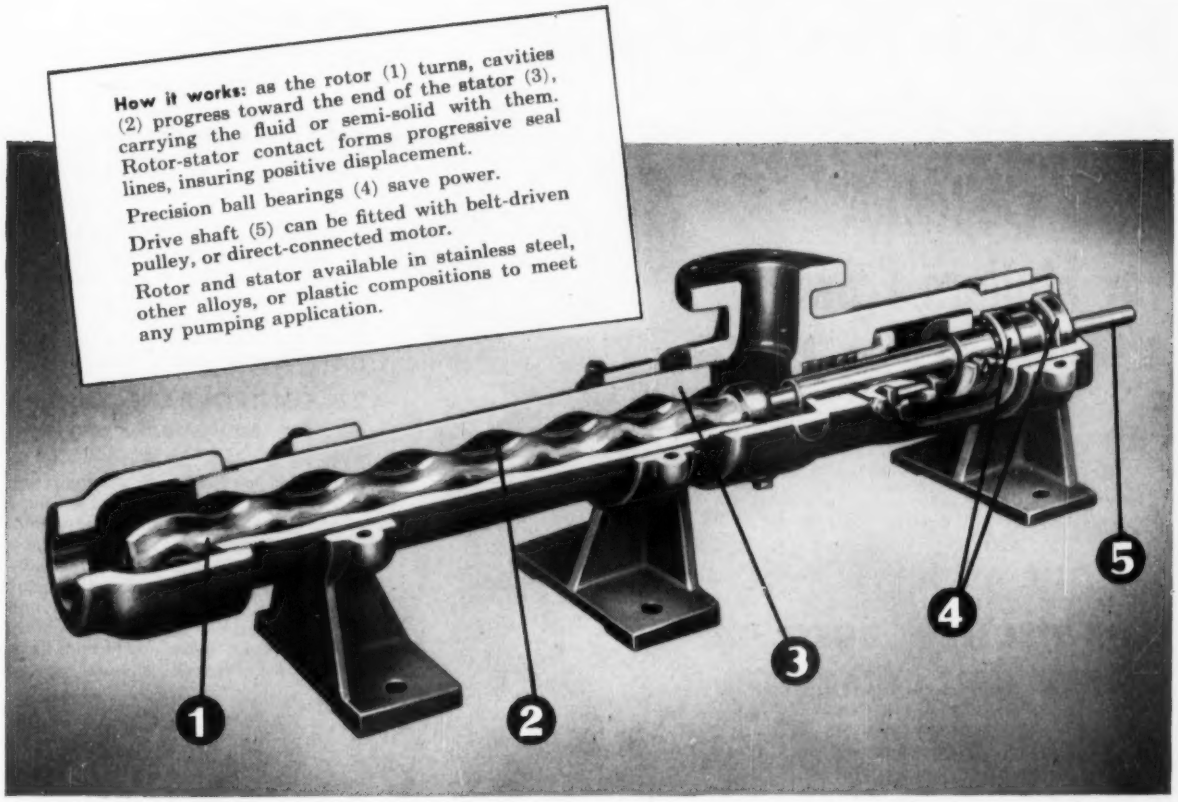
25—ROTARY STAND streamlines small parts storage

This compact, rotating storage unit is intended to simplify storage and handling of small spare parts such as nuts, bolts, rings, bearings, etc. Named the Vu-O-Matic, Rotary Stand, the unit consists of a series of circular trays accommodating glass jars of various sizes. The stand on which these trays are assembled consists of a base, thrust bearing, mast, and top cover. The complete tray assembly revolves as a single unit on ball bearings. The jars are easily removed, but rims on the trays keep them from tipping or falling off. Standard models are made with three, five, and eight trays and equipped with 16-, 8- and 4-oz. jars. (For details circle No. 25 on Reader Service Card.) The Union Metal Mfg. Co.



26—SNOW PROPHET knows when it's on the way

The Snow Detector is a weather-sensing unit designed primarily for de-icing of microwave antennas, but useful in other applications, too—including the automatic operation of sidewalk snow removal systems. The unit, only 7¼ in. dia., detects precipitation when the ambient temperature drops below 37 F. An integral heater melts the snow and


How it works: as the rotor (1) turns, cavities (2) progress toward the end of the stator (3), carrying the fluid or semi-solid with them. Rotor-stator contact forms progressive seal lines, insuring positive displacement.
Precision ball bearings (4) save power.
Drive shaft (5) can be fitted with belt-driven pulley, or direct-connected motor.
Rotor and stator available in stainless steel, other alloys, or plastic compositions to meet any pumping application.
1
2
3
4
5

If your pump requirements are a little different...

The entirely different MOYNO® Pump may be exactly what you need!

FACTS ABOUT THE MOYNO

the world's simplest pump

- **Positive Displacement**—Moynos are available to pull up to 29 inches of vacuum while discharging under pressure. Big Moynos can deliver up to 250 gallons per minute, against pressures up to 600 p.s.i.
- **Gentle**—no churning, foaming; won't break up semi-solids.
- **Reversible**—pumps with equal efficiency in either direction.
- **Trouble-Free**—self priming; won't cavitate or vapor-lock. Just one moving part—no valves to stick, no pistons to gum up. Built for tough service, easy to maintain.
- **Versatile**—handles liquids, pastes, abrasive-laden slurries, vacuum applications.

You name the problem! Are your pumped materials viscous, semi-solid, hard to move? Do they tend to disintegrate? Are they abrasive? Do pump maintenance costs seem high? If "yes" is the answer to any of these, find out why Moyno Pumps handle jobs where other pumps fail!

The Moyno is different! The cutaway view above—and the facts listed at left—describe a completely new concept of pump design. They show why the Moyno is a pump you can specify, install and *forget*.

Will it solve your problem? Chances are it will . . . at least there isn't a more versatile pump made! Moynos pump clay for a leading pottery maker. They're being used for handling white water in paper mills . . . for caustics . . . an Eastern food producer is even using them successfully for pumping potato salad!

Get more facts today! An interesting, factual bulletin will tell you more about the simple, versatile Moyno Pump. Write for your free copy of Bulletin 30-PH.

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Fractional & Integral h.p. Motors & Generators

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For more facts circle 589 on Reply Card

NEWS–for Plant Engineers about an efficient Dust Collector for Boilers from 100 to 2000 BHP!

IT'S THE NEW BUELL 'LR' FLY ASH COLLECTOR

Now! Get 99% of all cinder discharge –100-mesh and larger! The 'LR' collector–with low draft loss--is extremely effective on *natural*, as well as *forced* draft installations. For more information on how the new Buell 'LR' Dust Collector will help solve your Fly Ash problem, write today for the new 'LR' bulletin.

Buell Engineering Company, Dept. 14-A,
70 Pine Street, New York 5, N. Y.

buell®

Engineered Efficiency in **Fly Ash Collection**

For more facts circle 590 on Reply Card

NEW PRODUCTS

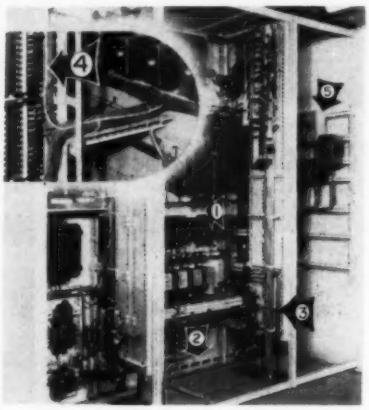
(Begins on page 126)

ice collected in the "bowl." No power is consumed either by the detector or by heaters at higher temperatures.

Fully automatic, the detector turns on heating elements whenever icing conditions exist; turns them off when hazard is past. Up to 30 amp at 117 v a-c can be switched without external relays. Roof, wall and pole mountings are possible—vertical rods around the edge of the unit keep birds from nesting in it. (For details circle No. 26 on Reader Service Card.) Motorola, Inc.

27—CONTROL PANEL provides for equipment, servicing

Pictured below is the rear view of an automatic control panel incorporating this manufacturer's newest developments in panel design and construction. These advancements are numerically keyed to the illustration. (1) Accessibility is provided through vertical support areas, systematically spaced and dividing the panel into bays of associated instruments and operating lines. (2) Control room floor openings and



external tubing and wiring conduits may be completed in advance of panel installation. Panel bay widths are easily determined once major instruments have been selected and located.

Tubeways (3) provide centralized distribution points. Panel tubing is concentrated on vertical supports designed to carry instrument control and meter pressure lines from remote points to panel mounted instruments. Wireways (4) enclose compact, but accessible, electrical terminal blocks. Installing, testing and tracing by user can be done faster and with less inconvenience or error, company points out, and additional terminals may be added without obstructing existing facilities. Adjustable wall racks (5) are used to facilitate mounting of any make of control boxes, alarms, relays and breakers, and to permit installation of additional equipment without welding special mounting pads to panel walls. Manufacturer adds that in the panel shown, 12 sq ft of additional equipment and tubing may be mounted without

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Absolutely correct! Tycol Diesel Oils are a must for satisfactory lubrication. Their degree of refinement – their service endurance – and their high stability mark them outstanding.

Tycol Diesel Oils have more than proved themselves after years of operation in Diesels of every description and in all types of service . . . from high-speed units for industrial, railway and marine uses where a heavy-duty or detergent oil is necessary to low-speed Diesels where a non-additive lubricant can be used. Yes, sir, there is a Tycol Diesel Oil scientifically engineered for every Diesel application – engineered to do the job better . . . at lower cost.

Your nearby Tide Water Associated office will be glad to give you complete information. Wire or phone today.

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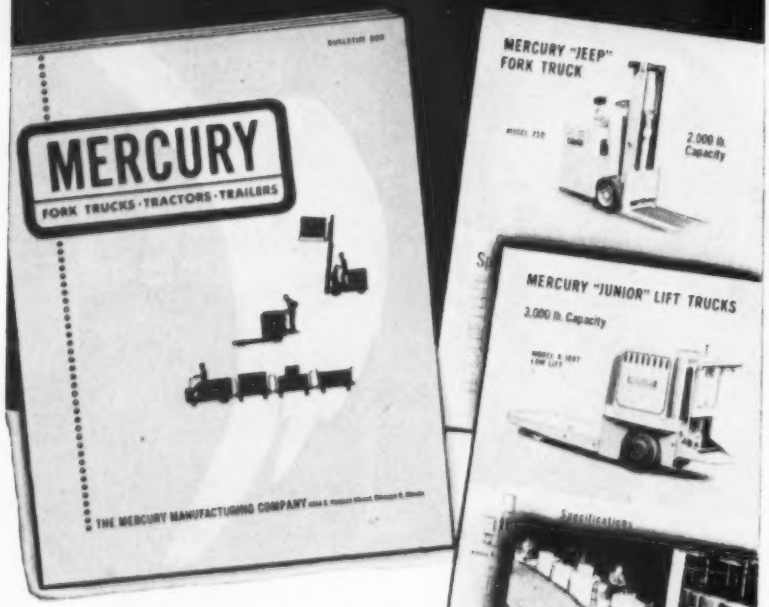
IT'S NEW!

IDEAS METHODS EQUIPMENT

for CUTTING YOUR HANDLING COSTS



44 pages of valuable information for you

COMPARISON OF SYSTEMS . . . factual appraisals of fork truck, lift truck, tractor and trailer systems outlining their advantages for specific types of handling operations.

ATTACHMENTS—ACCESSORIES . . . to help you meet your specific handling problems. Be it cartons, bags, drums, bulk material, bales—there's MERCURY equipment to meet your requirements.

COMPLETE PRODUCT SPECIFICATIONS . . . for the entire Mercury line. Here is essential information for planning your plant system and solving your individual handling problems. Write for your FREE copy today.

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TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

For more facts circle 592 on Reply Card

NEW PRODUCTS

(Begins on page 126)

affecting accessibility to instruments and controls. (For more details on the panels circle No. 27 on Reader Service Card.) Bailey Meter Co.

28—BELT CONVEYOR is a versatile, portable unit

This is announced as a ruggedly built unit designed for conveying miscellaneous materials. Elevation is adjustable by a series of holes in the supporting legs; and the length can be made as required, from 10 to 25 ft, with belt

width from 12 to 36 in. Since the carrying surface is above side frames and supporting framework, material wider than the conveyor itself can be carried on the belt. A long continuous conveyor can be made up by coupling two or more units together. (For bulletin circle No. 28 on Reader Service Card.) Standard Conveyor Corp.

29—ELECTRIC HEATER for preheating of large studs

This heavy-duty heater is designed to preheat large studs used to clamp castings together on heavy equipment, such as hydraulic presses. In order to tighten nuts securely, the studs must be lengthened temporarily. This is done by drilling a hole through the stud and inserting the heater in this hole. The stud expands lengthwise to let the nuts be tightened more than would be possible if the stud were cold. When the heater is withdrawn and the stud cools, a tight fit results, company states, in the same manner that rivets join structural steel members.

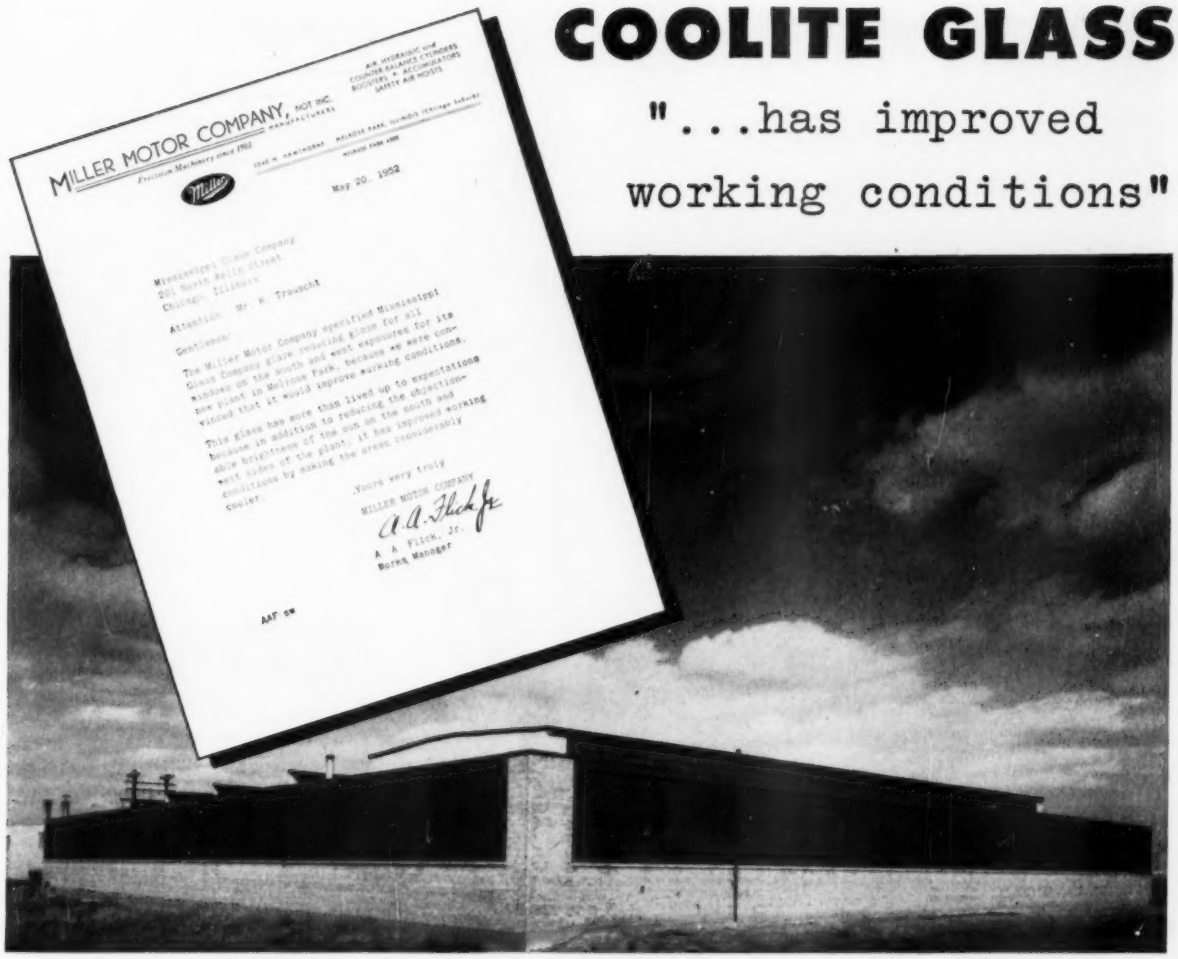
The stud heater consists of alloy-sheathed Chromalox electric tubular units fitted in a gun-shaped stainless steel holder. The handle grip aids extraction of the heater. Standard lengths range from 10 to 70 in., capacities from 2 to 12 kw, and outside diameters from ½ to 1 in. (For more information circle No. 29 on Reader Service Card.) Edwin L. Wiegand Co.

30—SCREW FEED serves as automatic conveying device

The screw feed used in coal stokers is reported to have been successfully adapted as a large-scale automatic conveyor. Called Flo-Tubes, the cast-iron trough is bolted together in sections capped with removable steel plates and inserted in the bottom of the bin or pile with one end left exposed for pick-up. Flo-Tube on an incline fills one hopper directly or two hoppers by a Y-chute arrangement at the top end. Horizontally, a single Flo-Tube using gate valves will feed two, three or a battery of hoppers. High and low

COOLITE GLASS

"...has improved working conditions"


MILLER MOTOR COMPANY, INC.
May 20, 1952
Gentlemen:
The Miller Motor Company specified Mississippi Glass Company glare reducing glass for all windows on the south and west exposures for its new plant in Melrose Park, because we were convinced that it would improve working conditions.
This glass has more than lived up to expectations because in addition to reducing the objectionable brightness of the sun on the south and west sides of the plant, it has improved working conditions by making the areas consistently cooler.
Yours very truly
MILLER MOTOR COMPANY
A. A. Flick, Jr.
Works Manager

Miller Motor Company, Melrose Park, Illinois. John S. Cromelin, Architect, Hamilton Glass Company, Glazier.

Manufacturer of Air and Hydraulic Equipment Selects COOLITE GLASS by Mississippi to Cut Raw Sun Glare and Heat

Modern management knows that workers who see better, produce better . . . and this testimonial from a user of Coolite, Heat Absorbing, Glare Reducing Glass by Mississippi highlights the importance of "visioneering" in a modern plant. Coolite traps and absorbs much of the sun's heat—helps keep interiors comfortably cool. Coolite also filters out annoying glare, floods work areas with pleasantly tinted, softened, filtered light that cuts costly eye fatique.

Conditioned, natural illumination helps reduce operating costs—and Coolite is easy to maintain, eliminates need for painting or makeshift blinds.

Specify Mississippi Glass to your architect, builder or contractor. Available in a wide variety of patterns and surface finishes, all scientifically designed to distribute light to best advantage.

MISSISSIPPI Glass COMPANY

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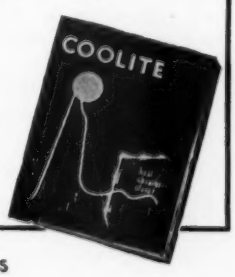
SEE HOW COOLITE CAN SAVE MONEY FOR YOU

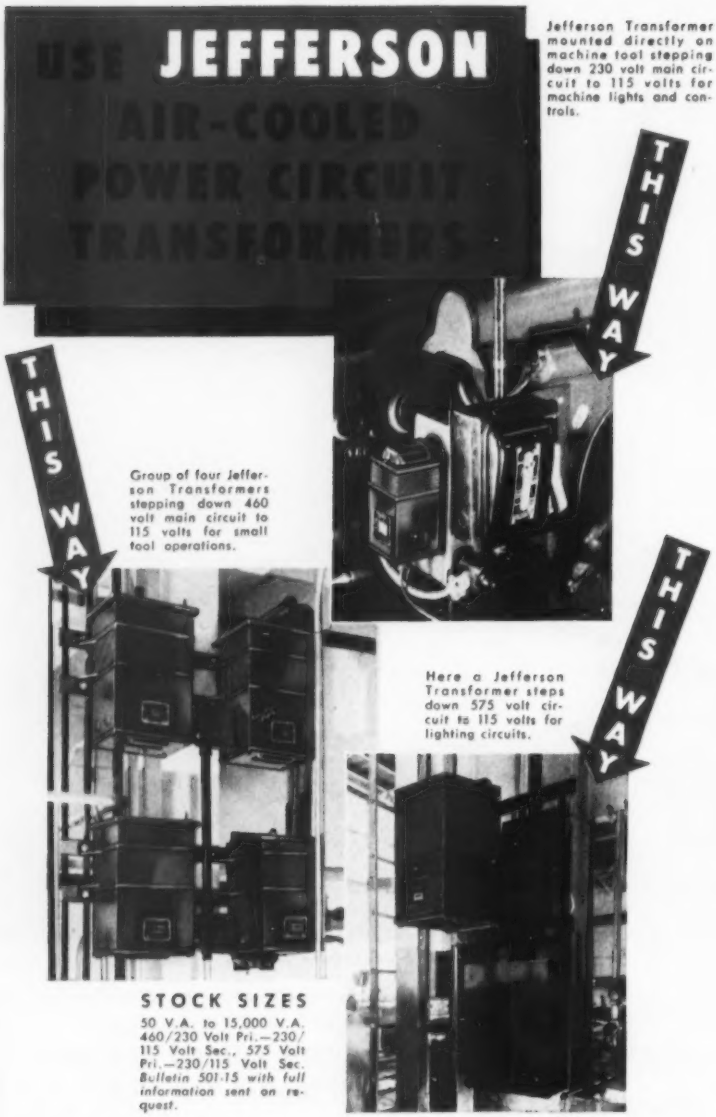
If your are modernizing existing facilities or constructing new ones, include Coolite Glass in your plans. Its cool, blue-green color adds a modern note to any exterior. Coolite's filtered light can provide increased efficiency ond economy, boost employee morale and reduce rejects. See your Mississippi Glass distributor today.

Send for free Coolite Catalog, "Coolite Heat Absorbing and Glare Reducing Glass." Samples on request.



WORLD'S LARGEST MANUFACTURER OF ROLLED FIGURED AND WIRED GLASS

For more facts circle 593 on Reply Card


USE JEFFERSON
AIR-COOLED
POWER CIRCUIT
TRANSFORMERS
THIS WAY
THIS WAY
THIS WAY
Jefferson Transformer mounted directly on machine tool stepping down 230 volt main circuit to 115 volts for machine lights and controls.
Group of four Jefferson Transformers stepping down 460 volt main circuit to 115 volts for small tool operations.
Here a Jefferson Transformer steps down 575 volt circuit to 115 volts for lighting circuits.
STOCK SIZES
50 V.A. to 15,000 V.A. 460/230 Volt Pri.—230/115 Volt Sec., 575 Volt Pri.—230/115 Volt Sec. Bulletin 501-15 with full information sent on request.

Distribute Economical High Voltage...460-575

Provide Low Voltage Only Where Needed...115-230

High voltage power distribution provides greater volt-ampere capacity with no increase in copper wire and steel conduit sizes. You save materials, wiring costs, maintenance costs, installation time and eliminate duplicate wiring.

Jefferson Power Circuit Transformers can be mounted directly on or adjacent to machinery or wherever low voltage is required. Air-Cooled "Dry Type" construction makes Jefferson Transformers exceptionally compact and easy to install. Ample wiring compartments and *both* ½" and ¾" knockouts are provided for rigid or flexible conduit connections.

Approved by Underwriters' Laboratories, Inc.

JEFFERSON ELECTRIC COMPANY

Bellwood, Illinois

Jefferson Transformers

For more facts circle 594 on Reply Card

NEW PRODUCTS

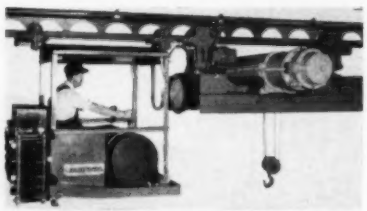
(Begins on page 126)

levels in the hoppers are maintained by off-on switches.

In addition to coal, Flo-Tubes are expected to have application in the handling of grain, pellets, flakes, seed, chips and other bulk materials. Range of sizes offered convey up to 10,000 lb of coal per hour. Manufacturer says shoveling can be eliminated almost completely if bin bottom is slanted to feed exposed entry end of Flo-Tube by gravity. (For illustrated bulletin circle No. 30 on Reader Service Card.) Canton Stoker Corp.

31—TRAMRAIL CARRIER has scale for weighing loads

This overhead travelling carrier has a hydraulic cell scale for quick weighing of loads handled. The hydraulic cell (not visible in photo) is operated by a lever to which is fastened the upper hoist block. Resulting pressure is trans-



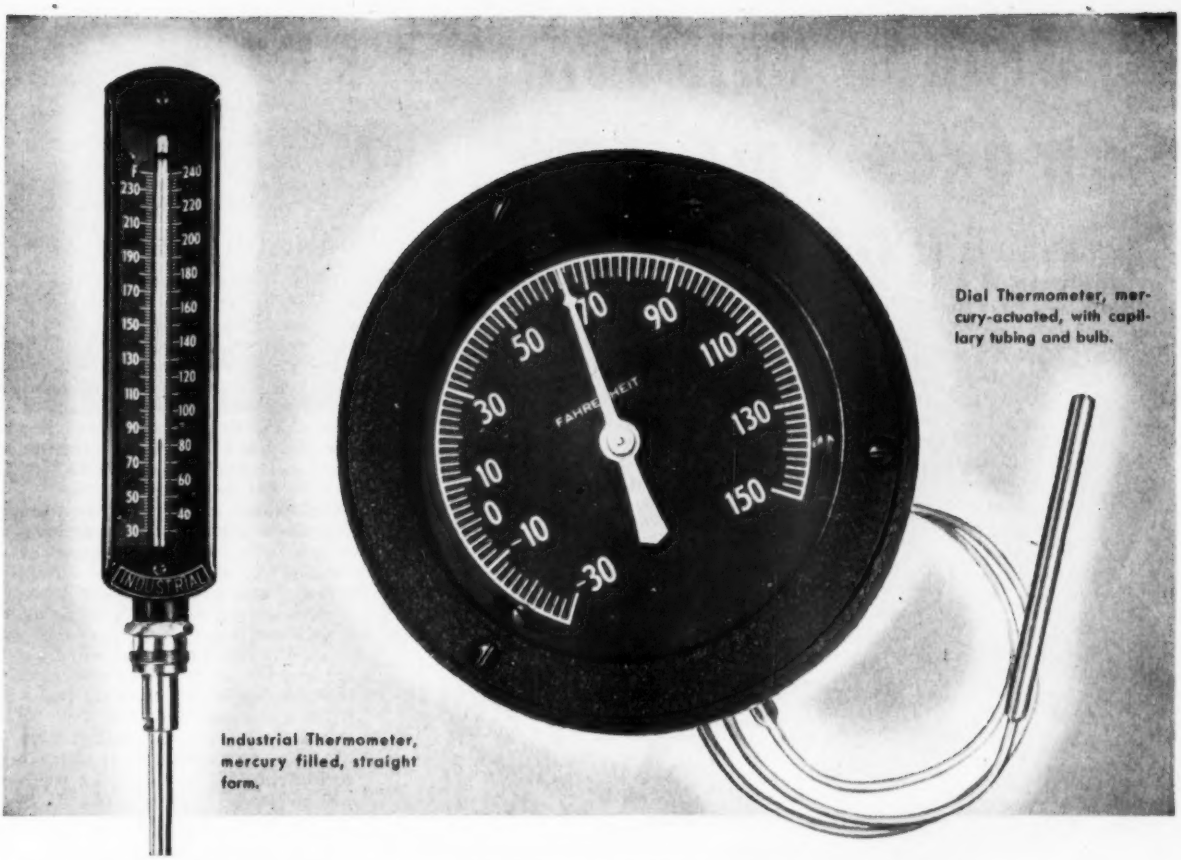
mitted from cell to scale dial by hydraulic tubing. The scale weighs in pounds or kilograms, as desired.

The motor driven tramrail carrier has a travel speed of 300 fpm; the hoist has a speed of 38 fpm, a lift of 36 ft. Both travel and hoisting motors have variable-speed controllers and the hoisting controller is designed for dynamic lowering. Although the load capacity of this model is 3 tons, variations can be designed to accommodate other loads, speeds and lifting distances. (Circle No. 31 on Reader Service Card.) Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

32—CONTROL UNIT recovers coolant oil from mist

A redesigned Precipitron Oil Mist Control Unit for recovering coolant oil from mist and smoke generated by high speed machining operations is announced as available in two models: the Type PO-6 with an air handling capacity of 600 cfm, and the Type PO-12, 1200 cfm. Besides the salvage of coolant oil, this oil mist control unit is said to reduce slippery floors, contaminated atmospheres and fire hazards; to afford worthwhile savings in heating costs by not exhausting usable heated or conditioned air; to reduce building maintenance costs by providing an oil- and smoke-free atmosphere; to provide cleaner working conditions.

The self-contained unit is housed in a heavy-gage steel cabinet. Fan motors are three-phase, fractional horsepower, totally enclosed, for 220 or 440 v



Industrial Thermometer, mercury filled, straight form.

Dial Thermometer, mercury-actuated, with capillary tubing and bulb.

HAVE YOU AN INDUSTRIAL TEMPERATURE TO TAKE?

Whenever an industrial temperature has to be taken there is a USG thermometer for the job. You have your choice of the Industrial Type in all sizes, and mounting forms with standard or protected stems; or the Dial Type in a variety of sizes, case styles, mountings, ranges, and connections. Gas, mercury or vapor-actuated.

For typical applications of commercial and approved Navy Standards, covering dimensional information and the use of bushings, flanges, sockets and special tubing, send for Catalogs 100 and 200.

Special thermometers for dough testing, milk testing, fuel gas, candy, solder baths, varnish, canning, vulcanizing and other unusual processes.

Industrial Thermometer of the 45° Recline Form. There are 5 other standard forms.

Dial Thermometer with bottom-connected rigid stem, one of many USG types available.

UNITED STATES GAUGE

United States Gauge
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Gentlemen: We are interested in USG ☐ Industrial Thermometers; ☐ Dial Thermometers. ☐ Please send us your catalog. ☐ Have your man call. No obligation, of course.

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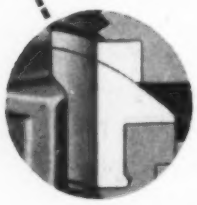
For more facts circle 595 on Reply Card

Ground Ball Joint makes 'em LEAKPROOF



This True Ball Joint Makes the Difference

True Ball Joint—Dart seats are spherically ground to form wide, true-bearing surfaces. Seats remain unscarred and true — always in shape for repeat use. Used over and over again — Darts stay tight without jamming.

QUICK FACTS

- 2 Bronze seats resist pitting and corrosion — provide years of leakproof service
- Heavy shoulders can withstand brutal wrenching
- Nut and body of air-refined, high test iron are practically indestructible

These Dart features mean important savings over the years for every user.

DART UNION COMPANY
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The Fairbanks Co. — Distributors
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DART
UNIONS

For more facts circle 596 on Reply Card

NEW PRODUCTS

(Begins on page 126)

service. The power pack operates from a 115 v line. (For information circle No. 32 on Reader Service Card.) Sturtevant Div., Westinghouse Electric Corp.

33—ENCLOSED MOTOR for use in hazardous locations

The totally-enclosed Type SS is suggested for services where dampness, dust, fire hazards and corrosive fumes are prevalent. Because of its construction it is self cooling, company points out, and its smooth exterior lends itself to wiping off or hosing down. This motor also has a slinger to protect the output shaft bearing against the entrance of dirt or water.

Manufacturer explains that there sometimes occurs in totally-enclosed motors a moist condensation caused by "breathing" of a motor under certain conditions and that this can cause grounding of the motor. To overcome this problem, manufacturer has available an Underwriters'-approved drain plug designed to release water from the interior while still retaining explosion-proof characteristics. The Type SS Motor is now available in ratings from 1/3 to 2 hp—larger ratings are planned. (For Bulletin 1784 on this motor circle No. 33 on Reader Service Card.) U. S. Electrical Motors Inc.

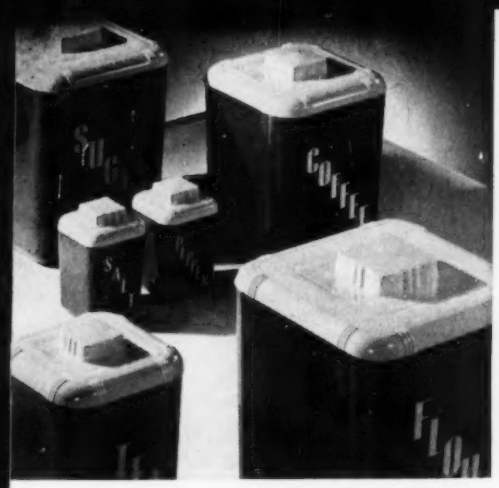
34—COMPRESSOR is designed for operating efficiency

The Spiraxial Compressor is announced as entirely new in principle and design within its range. Instead of conventional rotors, this air or gas compressor employs two intermeshing screw-rotors which rotate in opposite directions. These screws are operated by gears synchronized to prevent contact, allowing close but definite clearances. The flow of air or gas is axial with most of the compression taking place at the back of the casing, it is explained, and this permits a large inlet opening to prevent strangulation of inlet air, raise volumetric efficiency.

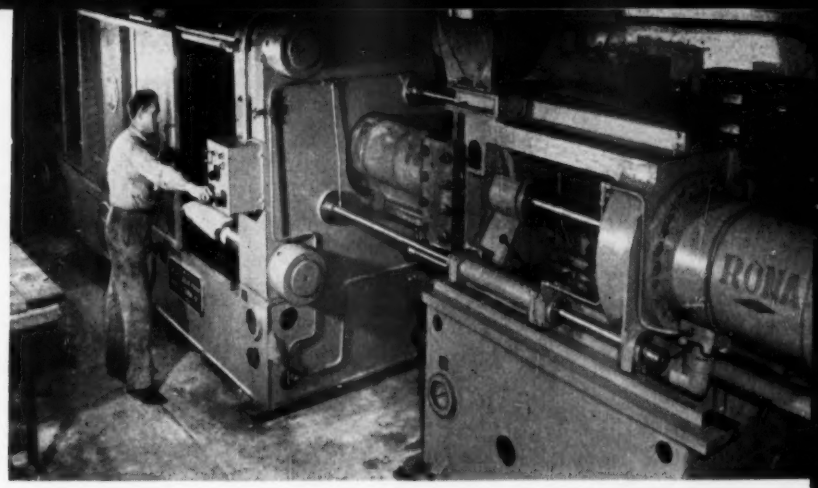
Five advantages are claimed for this new design: peak efficiencies at discharge pressure determined by requirements; no internal lubrication; minimum servicing; low noise level, and light weight. (For Bulletin CS-152, giving construction details, circle No. 34 on Reader Service Card.) Roots-Connersville Blower.

35—SNAP-ACTION SWITCHES for actuating low forces

Designed for actuating forces as low as ½ oz, these switches are provided with rigid lever integral actuators which adapt them to actuation by cams or by straight-line motion. The new series is said to be particularly useful in low-force, cam-actuated applications on timing clock motors, instruments and meters. The switches are also used in rotary switch assemblies, in sequence



NO MORE PROBLEMS. The production of plastic household items by Rona Plastic Corporation was slowed down by an inadequate hydraulic oil. A switch to Sunvis 999, over a year ago, restored it to normal.



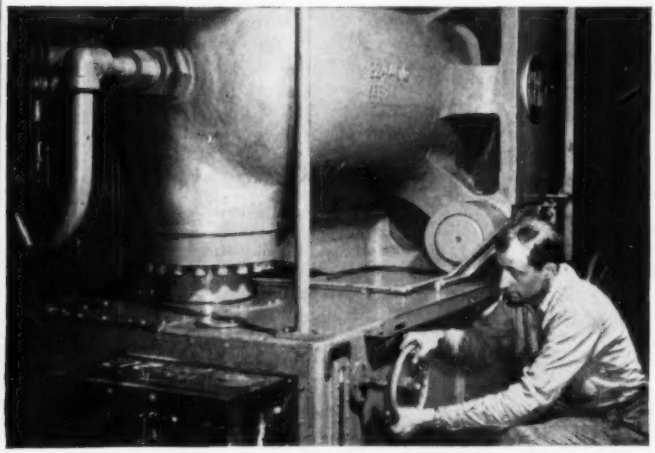
PRESSURE LOSSES ENDED. There are few plastic molding machines as big as this 60 ounce model. It exerts a pressure of 1,000 tons. Because the hydraulic oil formerly used sludged up and thinned out, it could not maintain this pressure. But Sunvis 999 has fully met these severe requirements, as well as those of Rona's nine other hydraulic machines of varying sizes.

PLASTIC MOLDER'S BOTTLENECK ENDED BY SUNVIS HYDRAULIC OIL

More than a year ago Rona Plastic Corporation, New York City, had trouble with its hydraulic molding machines. The machines functioned erratically due to oil sludge sticking the control mechanisms. In addition, the oil thinned out excessively at normal operating temperatures, and resulted in the loss of proper clamping pressures on the dies. To keep the machines going at all, it was necessary to drain, clean, and entirely recharge the systems at frequent intervals.

A Sun representative, called in by Rona, studied the problem and recommended Sunvis 999. He knew it would put an end to pressure losses, because, even at elevated temperatures, it does not decrease in viscosity as much as most other oils. He also knew its exceptional stability would end the sludging problem.

Sunvis 999 proved to be the answer to all Rona's hydraulic oil problems. The original charges, with minimum make-up, are still giving good service. Rona can expect the same performance for a long time to come, because experience shows that under normal operating conditions, Sunvis 900 Series Oils are *good for the life of the equipment.*



NO OIL CHANGES HAVE BEEN NEEDED. Before Sunvis 999 was adopted, the oil in each of the machines had to be changed frequently (the one pictured holds 450 gallons). The original charges of Sunvis 999 have been in use now for more than a year.

Department PY-1
Sun Oil Company, Philadelphia 3, Pa.

I am interested in knowing more about Sun Hydraulic Oils. ☐ I would like to consult with a Sun representative. ☐ Send the booklet "Hydraulic Fundamentals and Industrial Hydraulic Oils."

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TECHNICAL ASSISTANCE AVAILABLE. Sun's engineers are at your service for consultation on all hydraulic oil applications. It will pay you to utilize the experience they have gained in solving a wide variety of problems in many different industries.

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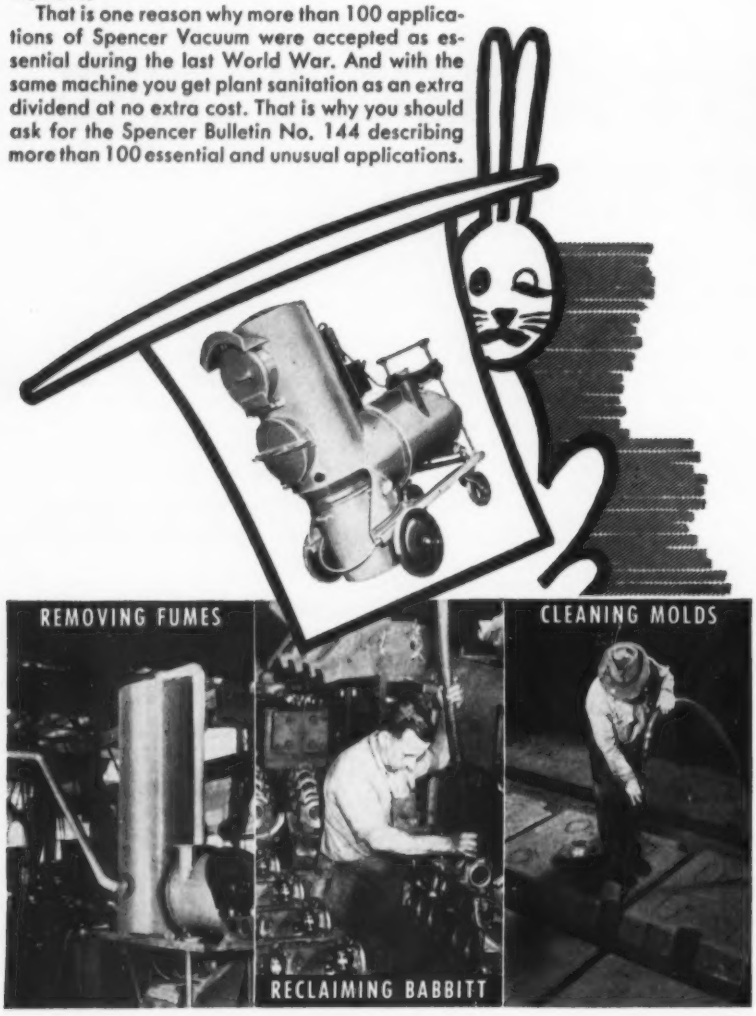
Doing the Impossible in a Jiffy [WITH SPENCER HARTFORD VACUUM]

When you pick a ton of babbitt a day out of engine heads, or remove specks from the bottom of a foundry mold, or eliminate welding fumes at their source with industrial vacuum, you are doing things that cannot be done by other methods.

That is one reason why more than 100 applications of Spencer Vacuum were accepted as essential during the last World War. And with the same machine you get plant sanitation as an extra dividend at no extra cost. That is why you should ask for the Spencer Bulletin No. 144 describing more than 100 essential and unusual applications.



427-C

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

For more facts circle 598 on Reply Card

NEW PRODUCTS

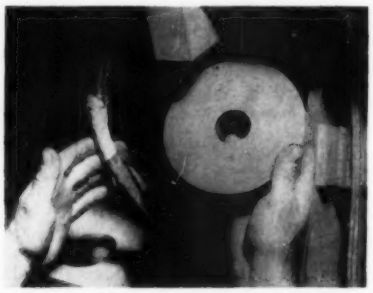
(Begins on page 126)

switching gangs, and limit switching.

The Type W80 has a flat lever actuator for operation by straight-line motion or slow-moving cams. The Type W82 has a steel roller on the end of the lever for reducing friction in cam actuation. Type W822 has a short roller lever actuator for fast cam action or for applications in which compactness and maximum resistance to vibration are required. Each type is available with solder lug or screw terminals. (For Data Sheet 64 covering these switches circle No. 35 on Reader Service Card.) Micro Div., Minneapolis-Honeywell Regulator Co.

36—INDUSTRIAL CREPE PAPER of greater tensile strength

This crepe paper, shown being wound on a brazed splice of lead coil, is said to be much stronger than black varnished cambric, also easier and less expensive to use. It's made of kraft and manila fibers. (For details on the paper circle No. 36 on Reader Service Card.) General Electric Co.

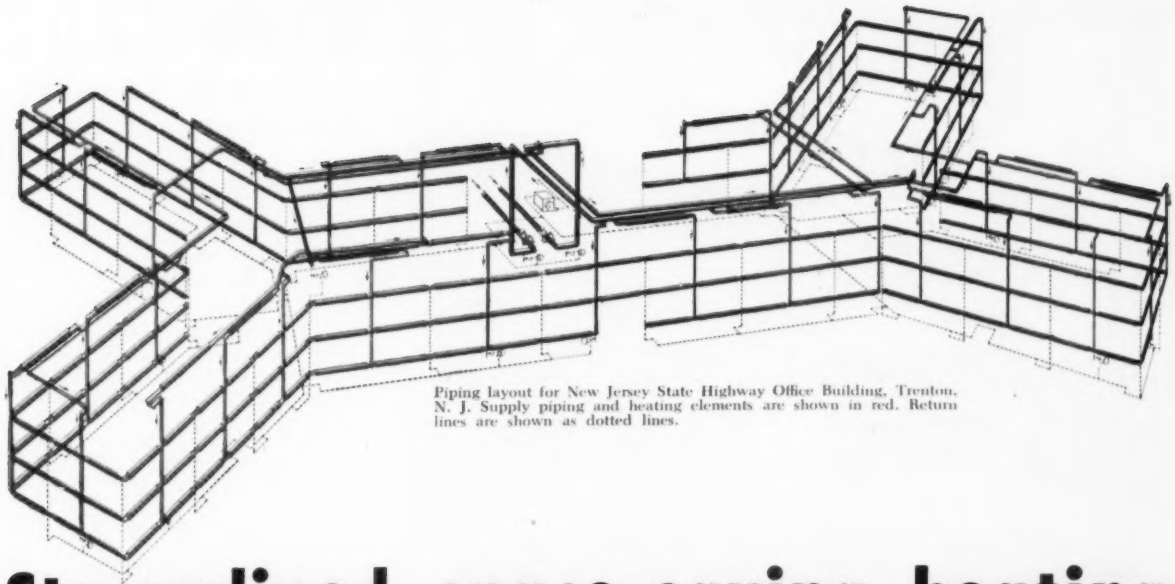


37—BATTERIES are housed in transparent plastic cases

The Exide-Tytex, Type COE, a new line of two- and three-cell industrial batteries in plastic containers, is intended to combine highly sustained useful voltages and long service with reduced operating and maintenance costs. Company claims the new line also offers dependability, greater output per unit of space and less weight per ampere-hour output.

The battery is designed to eliminate the need for wood trays and allow flexibility of installation, using standardized inter-unit connectors. Although light in weight, the clear polystyrene containers resist damage from shock and thermal stress, it is pointed out, and are impervious to effects from the electrolyte. The permanent bond between containers and covers is designed to prevent leakage of electrolyte from battery during its service life. Colored pilot balls show state of charge, and solution level lines show recommended levels of electrolyte.

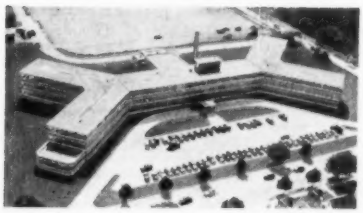
Three-cell units come in side-to-side assemblies; two-cell units are available in side-to-side or end-to-end assemblies. (For booklet and charts circle No. 37 on Reader Service Card.) The Electric Storage Battery Co.



Piping layout for New Jersey State Highway Office Building, Trenton, N. J. Supply piping and heating elements are shown in red. Return lines are shown as dotted lines.

Streamlined space-saving heating

NOW IN THIRD SEASON



Aerial view of New Jersey State Highway Office Building. Micklewright & Mountford, Trenton, Architects. Bunyon and Carey, Newark, Consulting Engineers. Philip S. Slack & Co., Trenton, Heating Contractors.

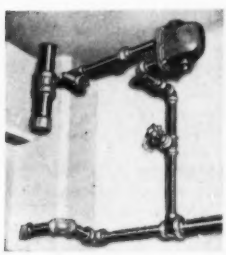
Webster Walvector spreads the heat . . . no cold spots. Note supply and return risers; location of Walvector trim piece connections below window mullions facilitating installation of office partitions. Webster Walvector Bulletin B-1551 sent on request.

The new $1,700,000 headquarters and office building for the New Jersey State Highway Department, sponsored by Governor Alfred E. Driscoll, is marked by three innovations: (1) for economy, streamlined modern design in place of usual monumental architecture; (2) for efficiency and parking ease, location outside of city; (3) streamlined, space-saving heating with Webster Walvectors. The alert cooperation of contractor Philip S. Slack in working out details of the new developments with the architects and engineers, contributed much to the success of the installation.

A Webster Moderator System provides "Controlled-by-the-Weather" heating for this modern building with Webster Walvectors equipped with integral tube orifices to spread the heat along exposed walls. Webster Convectors are used in stairways and Webster-Nesbitt Unit Heaters provide supplemental heating in corridors.

Call the authorized Webster Factory Representative or write us for his name. PE-1

WARREN WEBSTER & COMPANY
Camden 5, New Jersey : : Representatives in Principal Cities
In Canada, Darling Brothers, Limited, Montreal



Typical Drip Connection. For ratings and dimensions on Webster Drip Traps, ask for Bulletin B-151A.

Moderator Control Valve. For full details on the Webster Moderator System, ask for Bulletin B-904A.

WEBSTER
MODERATOR
SYSTEM
OF STEAM HEATING
"Controlled by the weather"

For more facts circle 599 on Reply Card

There's a cool load on both ends of the cable of this fast, versatile 7½-ton Bedford "Loadmaster" Crane owned by Philco Corporation. The fluid flexibility of Twin Disc Hydraulic Couplings keeps the motors *cool*—gives operators cushioned control to spot refrigerators easily and accurately. Work output steps *up*.

Reversing or stopping either bridge or trolley is fast and smooth. Load sway is held to absolute minimum, because the couplings soak up all shocks. Jerking is eliminated.

Designers and users both see distinct advantages in Twin Disc Couplings: *Compactness* and *two-way operation*. Twin Disc Hydraulic Drives have greater capacity for diameter, and will transmit power from either end—an important point for special installations.

For complete application engineering service—with thorough field assistance—call your nearest Twin Disc Hydraulic Drive Dealer today. Ask for Hydraulic Coupling Bulletin, No. 144-C.

Twin Disc 7.4S Model HCD Coupling transmits power from 2hp, 1200 rpm trolley motor of Bedford "Loadmaster" (top right) and 8.4 Model HCD is mounted on the 5 hp, 1200 rpm bridge motor (top left). HYDRO-SHEAVE® Drives handle either electric motors or internal combustion engines from ¾ to 50 hp.

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NEW BOOKS

for the plant engineer

Engine Performance

THE ENGINE INDICATOR by J. D. Hines. Size 5 by 7⅜ in.; 53 pp; illustrated; paper bound. Published by The Cooper-Bessemer Corporation, Mount Vernon, Ohio. Price $1.50.

THIS COMPREHENSIVE booklet has been prepared to assist operators of gas and diesel engines in keeping equipment at top operating efficiency by the use of the engine indicator.

It reviews the various types of engine indicators and points out limitations. Emphasis is made on the proper indicator and its correct application in improving performance of reciprocating engines and compressors.

The booklet also shows how to analyze indicator cards and suggests how this data can be used for balancing engine cylinders and calculating mean effective pressure. Procedures for avoiding mechanical inaccuracy in the setup of indicators are given. Use of the indicator in engine design is also covered.

Index of ASTM Papers

FIFTY-YEAR INDEX to ASTM Technical Papers and Reports. Size 6 by 9 in.; 207 pp; cloth bound. Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price $6.00.

THIS FIFTY-YEAR index provides a detailed author and subject index to all technical papers and reports dealing with materials, particularly their properties and testing appearing in ASTM publications covering the period from 1898 through 1950.

This index is intended to make readily available to the materials technologist, the researcher, the librarian, and all others concerned with the fields covered, pertinent information on a particular subject. Every effort has been made, after consultation with many users of indexes, to make available a ready means of locating information relative to a particular subject (or author) with a minimum expenditure of time and effort, without making the index too unwieldy.

Mechanics

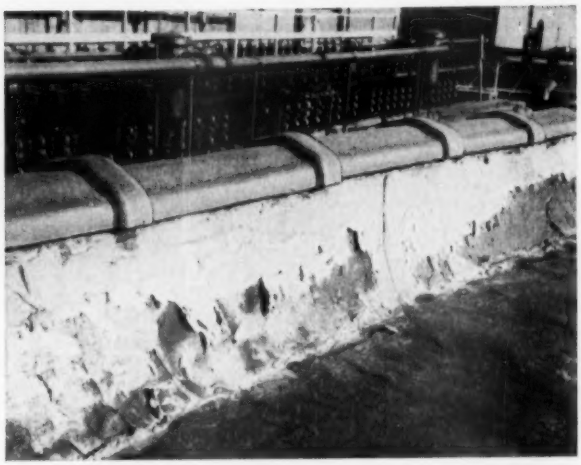
PART 2. DYNAMICS by J. L. Meriam. Size 6 by 9¼ in.; 330 pp; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $4.00.

THE AUTHOR handles the subject of mechanics in two parts. The first was previously reviewed in this section

DON'T TAKE YOUR ROOF FOR GRANTED

Get a Built-Up Roof Survey *FREE* of charge!

Rot, which is the result of condensation, may cause extensive damage to an uninsulated roof deck. The proper roof insulation would have prevented the condition shown here.



Improper materials, or inadequate application of the original felts and cementing agent, often cause troublesome leaks. In this case a cloth membrane was used instead of the proper flashing felt.

The *FREE* Roof Survey Report helps you avoid costly roof failures such as those shown above. It tells exactly what condition your roof is in, helps you plan roofing maintenance.

EVEN though your roof doesn't *seem* to be leaking, it may be in need of attention. Many a roof with torn flashings, dried-out felts, even rotted decks has been assumed to be in "good condition."

To anticipate costly damage, often hidden, and numerous repair bills, hundreds of plant engineers and maintenance executives have already used the free Johns-Manville Roof Survey Report.

The Roof Survey Report is an accurate picture made by a roofing *expert,* the J-M approved Built-Up Roofing Contractor. It covers all critical areas—flashings, decks, roofing felts, parapet walls, skylights, etc. And it will cost you only the trouble of asking for it.

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Let us send you the interesting booklet, "Things You Should Know About Your Roof." It gives complete information about the *free* J-M Roof Survey Plan together with the full story of the J-M Flexstone* Asbestos Roof and the Asbestile* Flashing System. Write Johns-Manville, Dept. PE, Box 158, New York 16, N. Y. In Canada, write 199 Bay St., Toronto 1, Ont.

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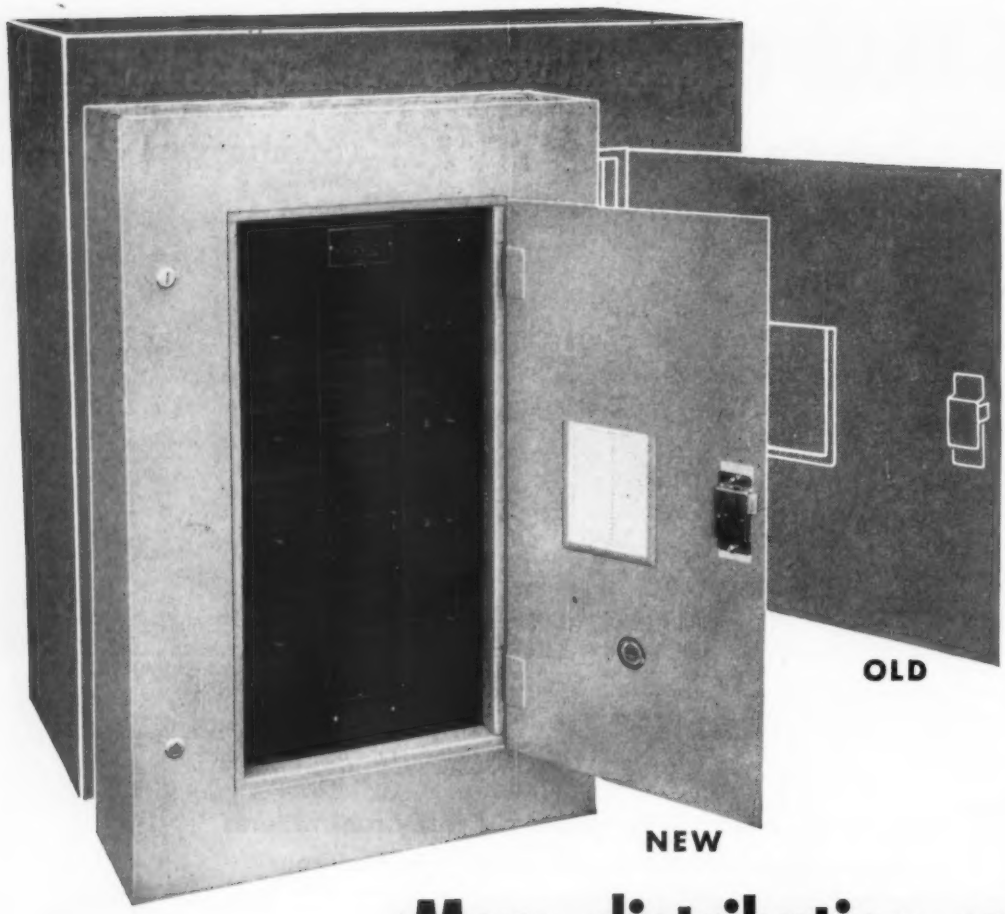
For more facts circle 601 on Reply Card



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Here's a more compact Convertible Distribution Panelboard for 240-volt, a-c* applications, up to 600-amp capacity with main lugs, or 225-amp main breaker with branch circuit breakers up to 100 amperes, 1, 2 or 3 pole.

This new NDP Panel supplements the well-known Westinghouse Type CDP Convertible Distribution Panel. In a cabinet 20″ wide, it is now possible to obtain circuit capacities for single phase as well as 3 phase and 3-phase 4-wire service, which formerly required the use of 30″ wide cabinets.

Certainly this outstanding development points to savings in money, material and space. Take advantage of it now. Simply call your Westinghouse Representative or write for DB-30-930, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-93495

*—*also 125/250 volt, 3-wire d-c systems*

YOU CAN BE SURE...IF IT'S

Westinghouse

For more facts circle 602 on Reply Card

and covers statics. This volume is devoted to the study of dynamics.

Many illustrations are used in this book to help clarify the principles involved in the solution of problems as well as text discussions. Whenever answers to problems are given these appear below the statement of the problem. For a better understanding of the material in this book, a knowledge of calculus is recommended.

The book contains 14 main sections. One chapter treats kinematics which deals with motion only. Another chapter is devoted to kinetics which covers motions resulting from action of forces. A section on impulse and momentum includes the subject of jet propulsion. Periodic motion, vibration and oscillation, is also covered. Two appendices carry moments of inertia and useful tables.

Gas Piping Systems

GAS TRANSMISSION and Distribution Piping Systems (ASA B31.1.8-1952) Size 8½ by 11 in.; 36 pp; illustrated; paper bound. Published by The American Society of American Engineers, 28 West 39th St., New York 18, N. Y. Price $1.25.

THIS CODE for pressure piping is one of a series of safety codes on various subjects which have been, or are being, formulated under the general auspices of the American Standards Association.

It is intended to set minimum safety requirements expressed in a language which is intelligible to all who design, manufacture, and erect piping systems, but not necessarily to cover the best practice known to the art.

While in most cases the requirements are mandatory, design recommendations have been included where they will be of assistance in securing safe piping systems.

Power Plants

STEAM POWER STATIONS by Gustaf A. Gaffert. Fourth edition; size 6 by 9 in.; 637 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 West 42nd st., New York, N. Y. Price $8.00.

THE MAJOR portion of this book acquaints the reader with a variety of equipment that goes into making up steam power stations. It was written expressly for students of mechanical engineering and reflects the author's many years of experience in designing and teaching.

The book is not limited to students in educational institutions. The manner in which it is presented makes it a useful source of information for practicing engineers and others who are interested in steam power plants.

These are a few of the chapters found in the book: Steam turbines; feed-water treatment; fuel burning

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2730 San Pablo Ave., BERKELEY

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equipment; draft system; coal and ash handling; steam station costs; fuels and combustion, and station design.

Molliere diagrams for both steam and mercury vapor are included. The book also contains a velocity and pressure drop chart for saturated and superheated steam along with a number of tables of graphs on different items.

Study of Engines

INTERNAL COMBUSTION ENGINES by Lester C. Lichty. Sixth edition; size 6¼ by 9¼ in.; 598 pp; illustrated; cloth bound. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. Price $7.00.

THE MORE difficult parts of the previous edition have been simplified in this revised book. Some of the old and questionable material has been eliminated and considerable new material has been added.

Development of the gas turbine, jet and rocket engines has necessitated inclusion of the Lenoir and Brayton cycles which were not of much interest before the second World War.

The air-standard analysis is used to explain all important cycles.

Combustion knock and knock rating, carburator and fuel injection manifolds and mixture distribution, engine lubrication, and mechanics of principal moving parts are some of the subjects covered by this book.

Metal Weldability

WELDABILITY OF METALS. Size 5¾ by 8¾ in.; 141 pp; illustrated; stiff paper binding. Published by The Lincoln Electric Co., Cleveland 17, Ohio. Price 50 cents in United States, 75 cents elsewhere, postage paid.

THIS BOOKLET gives answers on how to weld ferrous and non-ferrous metals. Frequent requests for information on how to weld various types of metals led Lincoln to publish this information in a special book so that it could be made widely available at low cost. For this reason, the section on Weldability of Metals has been reprinted from the 9th edition of their standard welding reference *Procedure Handbook of Arc Welding Design and Practice.*

The various types of carbon and alloy steels are described by giving nominal chemical analysis, properties, uses, characteristics, and best welding procedure for each.

The same treatment is given to copper, aluminum and nickel as well as their various alloys. Cast iron, forgings, cast steel, wrought iron, ingot iron, galvanized steel, terne plate and enameling stock are similarly covered. An analysis of the principles and practices of hard surfacing is also presented.

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A complete operational analysis of this plant was made by experienced Knight engineers. Their survey proved that modernization, rather than complete mechanization, would increase production per man hour, establish an equitable rate structure, and eliminate overtime which amounted to 5% of existing labor costs.

The modernization program, based on the relocation of equipment, motorization, and improved methods, has been carried out. In addition to achieving the objectives above, it has also resulted in improved quality control which reduced scrap waste by 50%.

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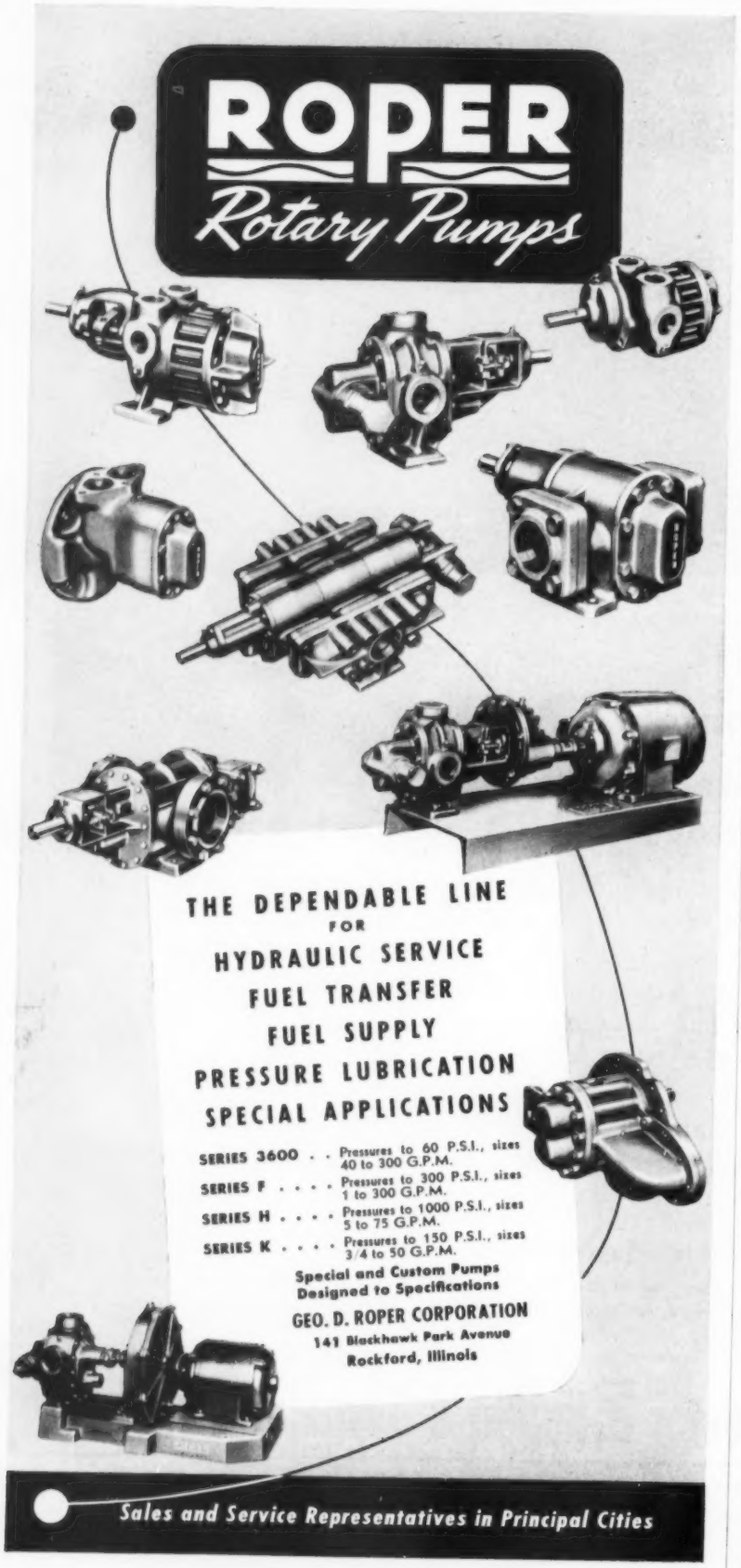
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SERIES K . . . . Pressures to 150 P.S.I., sizes 3/4 to 50 G.P.M.
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Plant Engineering Organization

(Continued from page 99)

ciples especially prepared for the engineer to study at home will be obtainable before long. With this knowledge, the engineer stands an unusual chance to advance into executive management. Increased technological advances in productive machinery make his place in top management inevitable. Thus, in years to come, more and more engineers will advance into management if they first understand their unique place there.

From where we work, it seems inevitable that plant engineers face certain objectives if they are to succeed which are as follows:

Surround their reports, plans, and estimates with integrity, respect, and impartiality;

Insist on deriving each solution to their problems through the use of basic logic and facts, realizing that many established prejudices are not facts;

Understand why engineering problems and solutions must be subject to the more important factors of cost, profits, and business principles;

Realize that their technical knowledge should be freely shared with all with whom they work and not reserved for exclusive use within their own offices;

Apply themselves and encourage their assistants to never cease studying new processes, equipment, and ideas; Equally stress the study of the basic principles of their own particular industry.

We feel that, in the years ahead, plant engineering departments will contribute immeasurably to the growth of American industry. It will not be done, however, by resting on past achievements. Work, study, growth in statue are the requirements. The rewards are substantial and most gratifying in the ever growing awareness of the contributions and improvements an engineer can offer his business and community.

Vibration Control

(Continued from page 83)

two simultaneously. By mounting both Bore-Matics on steel spring isolators it was possible to run them at the same time and turn out perfect work.

In another instance an Ajax 100 kw induction motor-generator set transmitted vibrations because of its high speed to other nearby motor-generator sets and machinery. In addition the vibration, which could be distinctly felt in the floor adjacent to the set, was the cause of very high maintenance costs. Mounting it on steel spring isolators stopped

JENKINS PRACTICAL PIPING LAYOUTS 64

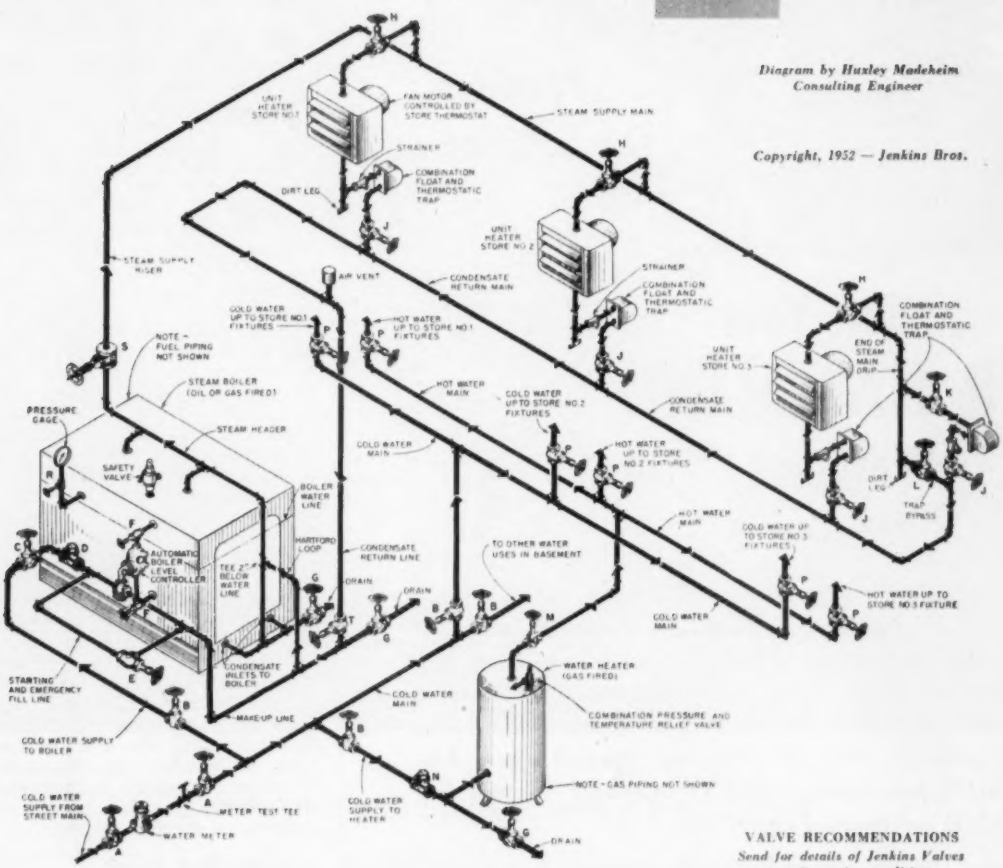
UNIT HEATER STORE NO.1
FAN MOTOR CONTROLLED BY STORE THERMOSTAT
STEAM SUPPLY MAIN
STRAINER
COMBINATION FLOAT AND THERMOSTATIC TRAP
DIRT LEG
UNIT HEATER STORE NO.2
STEAM SUPPLY RISER
AIR VENT
CONDENSATE RETURN MAIN
COLD WATER UP TO STORE NO.1 FIXTURES
HOT WATER UP TO STORE NO.1 FIXTURES
NOTE – FUEL PIPING NOT SHOWN
STEAM BOILER (OIL OR GAS FIRED)
HOT WATER MAIN
COLD WATER UP TO STORE NO.2 FIXTURES
END OF STEAM MAIN DRIP
UNIT HEATER STORE NO.3
PRESSURE GAGE
STEAM HEADER
SAFETY VALVE
COLD WATER MAIN
HOT WATER UP TO STORE NO.2 FIXTURES
TRAP BYPASS
BOILER WATER LINE
HARTFORD LOOP
CONDENSATE RETURN LINE
AUTOMATIC BOILER LEVEL CONTROLLER
TEE 2" BELOW WATER LINE
TO OTHER WATER USES IN BASEMENT
DRAIN
HOT WATER UP TO STORE NO.3 FIXTURES
CONDENSATE INLETS TO BOILER
WATER HEATER (GAS FIRED)
STARTING AND EMERGENCY FILL LINE
COMBINATION PRESSURE AND TEMPERATURE RELIEF VALVE
MAKE-UP LINE
COLD WATER SUPPLY TO BOILER
NOTE – GAS PIPING NOT SHOWN
COLD WATER SUPPLY FROM STREET MAIN
METER TEST TEE
WATER METER
COLD WATER SUPPLY TO HEATER

Diagram by Huxley Madeheim
Consulting Engineer

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VALVE RECOMMENDATIONS
Send for details of Jenkins Valves to suit varying conditions

Code	Quan	Jenkins Valve	Service
A	2	Fig. 370 Bronze Gate	Water Service Shutoff
B	4	Fig. 370 Bronze Gate	Distribution Shutoff
C	1	Fig. 106-A Bronze Globe	Water Supply to Boiler
D	1	Fig. 92 Bronze Swing Check	Prevent Boiler Backflow
E	1	Fig. 108-A Bronze Angle	Emergency Boiler Fill
F	2	Fig. 108-A Bronze Angle	Level Controller Shutoff
G	3	Fig. 106-A Bronze Globe	Drains Shutoff
H	3	Fig. 106-A Bronze Globe	Steam Supply to Heaters
J	4	Fig. 370 Bronze Gate	Condensate Drain Shutoffs
K	1	Fig. 106-A Bronze Globe	Steam Main Trap Connection
L	1	Fig. 106-A Bronze Globe	Trap Bypass
M	1	Fig. 47-U Bronze Gate	Hot Water Heater Shutoff
N	1	Fig. 92 Bronze Swing Check	Prevent Water Heater Backflow
P	6	Fig. 370 Bronze Gate	Water Supply Shutoffs
R	1	Fig. 743-G Bronze Needle	Pressure Gage Control
S	1	Fig. 651 I.B.B.M. Gate	Steam Main Shutoff
T	1	Fig. 370 Bronze Gate	Return Shutoff

How to plan PLUMBING AND HEATING IN A SMALL TAXPAYER BUILDING

The one-story "taxpayer" building developed with the movement of shopping centers to suburban areas. Constructed with or without a basement, it houses retail stores, service establishments, amusement centers, restaurants and offices.

Heating and plumbing requirements of such a building are usually provided by the owner, whose main interest is economy and trouble-free operation. An oil or gas fired steam boiler with automatic controls, and a separate gas fired heater for hot water supply, as illustrated, is commonly used.

The two-pipe heating system, located in the basement, utilizes unit heaters hung from the ceiling to save space. Individual thermostatic controls assure fuel savings and even heating. A further refinement of the control system would include an automatic shutoff or modulator valve on the steam line just ahead of each heater, and an aquastat in the condensate return line from each heater. Piping is simple in such an installation and standard-type valves are used.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17.

Complete description and enlarged diagram of this layout free on request. Includes additional detailed information. Simply ask for Piping Layout No. 64.

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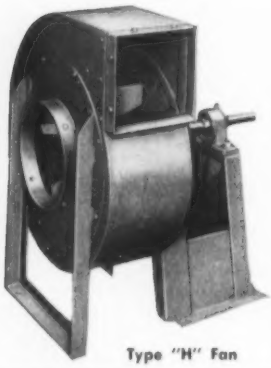

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the transmission of vibrations to other equipment to a degree where it was harmless, and also reduced maintenance and undue wear in the set itself. A Westinghouse motor-generator set was later similarly treated with equally good results. The installation at the first set is shown in Fig. 5.

From the foregoing discussion and the photographs it is evident that each case of vibration or shock control should be treated as a separate problem. Local conditions such as whether the building is of wood or steel construction, type of floor, proximity of other machines on which precision work is carried on, character of the ground on which the building rests, weight of the machines, nature of the vibrations (high or low frequency or shocks), all have a bearing on how best to correct the difficulty.

Specialized Job

As we have seen, in some cases resilient pads are enough and in others it is necessary to use the steel spring isolators under the four corners of a machine, or perhaps more, depending on its size, weight and shape. In many instances, in other plants, it has been found desirable to mount a delicate precision machine on a vibration control base in order to prevent the entrance of outside vibrations. These considerations go to show that this is a highly specialized subject and that those who have problems of this kind will do well to consult with a reliable manufacturer of vibration controlling equipment, who will gladly give the benefit of its experience for the asking.

Machine Tool Repair

(Continued from page 85)

the machines is low, the ramp edge is lowered to it. Consequently the machine can be easily rolled onto the truck body. As a matter of fact its movement over the ramp has to be retarded as the skates underneath would permit the machine to move too rapidly.

After a machine tool has been delivered to the shop, it takes on the average of 2 to 4 weeks before the machine emerges from the shop in good running order. This program of progressively repairing equipment from the plant has been in effect from the early part of the year. To date, ten machines have been given either a major overhaul or necessary repairs (such as ways-scraping) in this shop with satisfactory results. Scrap figures have been lowered, production improved and maintenance personnel has more time available for other work throughout the plant.

This is the first part of a two part article. Second part will appear in a subsequent issue. Editor

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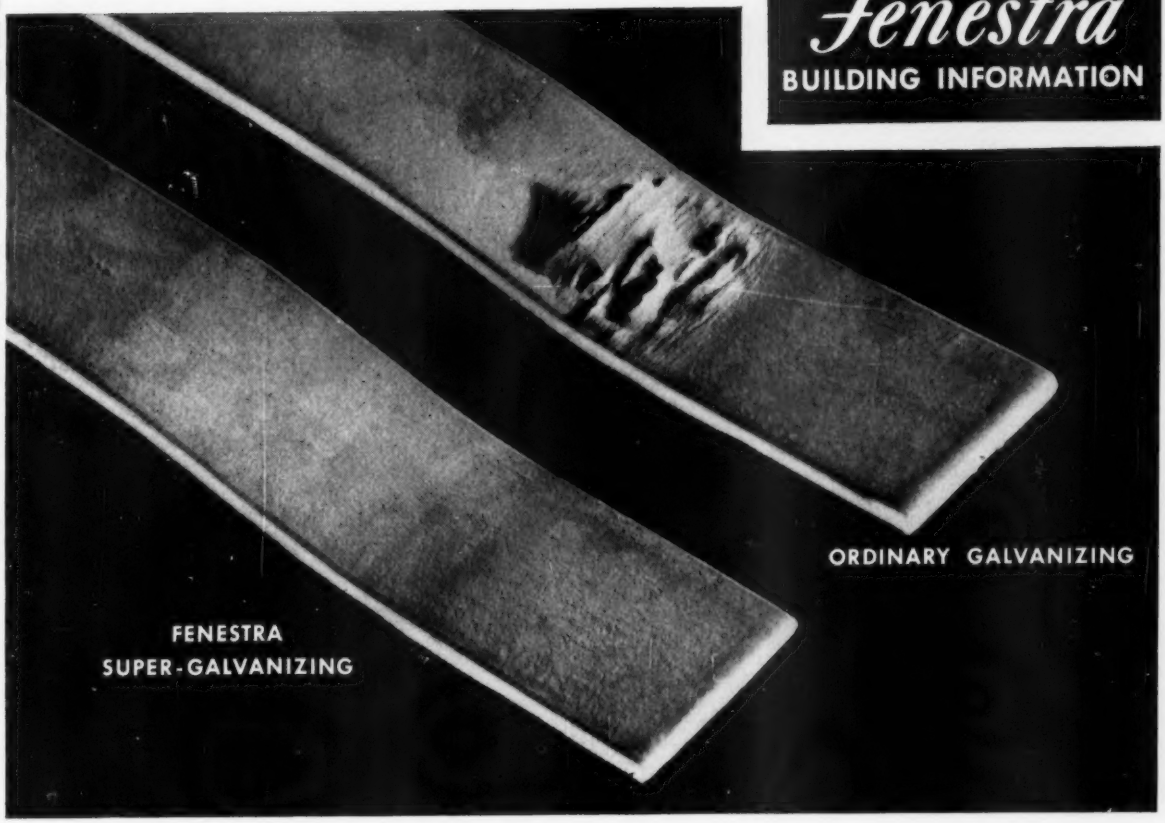

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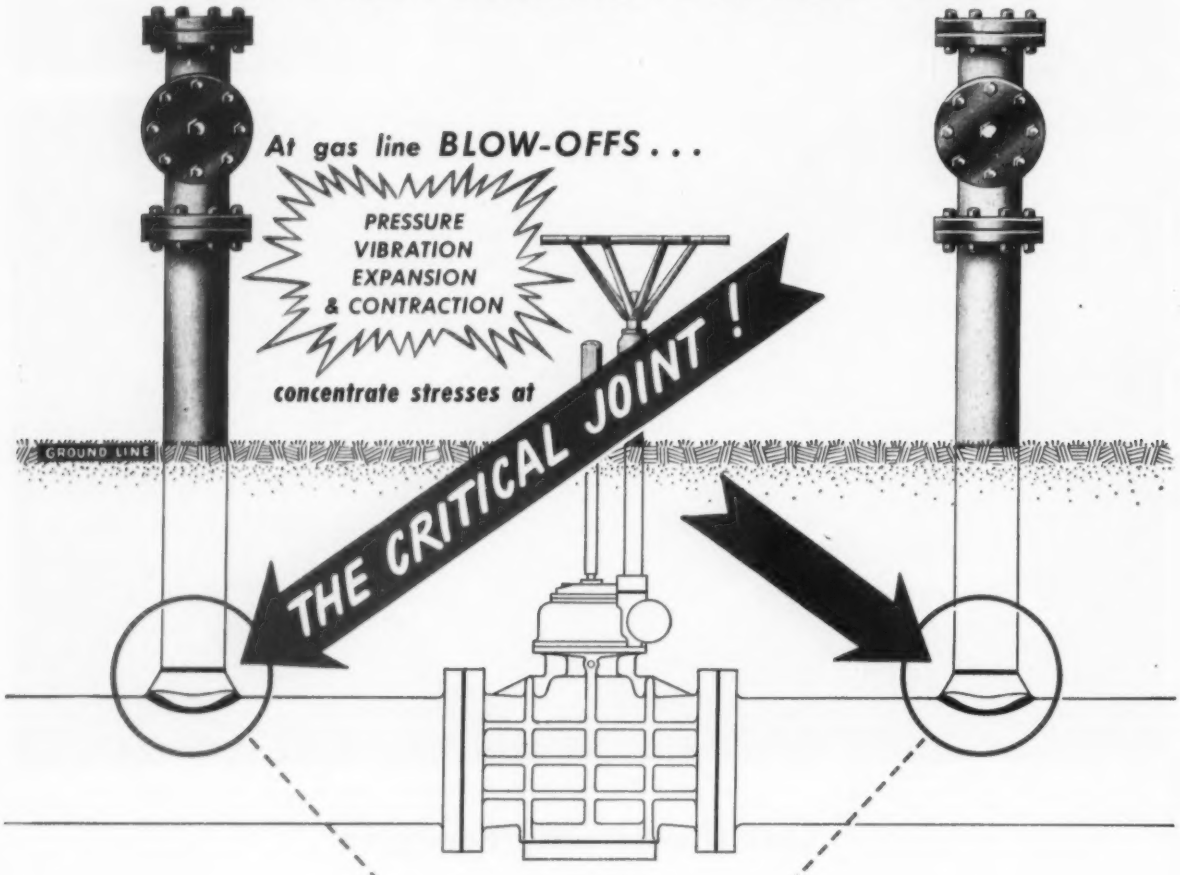

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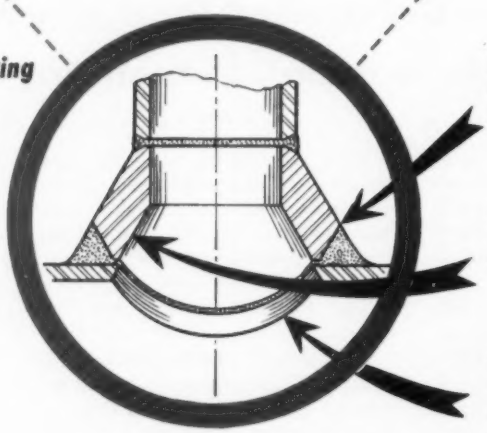

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(Continued from page 36)

gas compressors. Shows how this valve is designed to simplify an installation, to provide trouble-free service. Pennsylvania Pump & Compressor Co.

137 Swing Joints—Detailed information on ball-bearing equipped swing joints is given in 8-pp illustrated Catalog 400. These new joints are designed for loading and unloading lines handling oils and gasoline, gas and many chemicals. Single and double swing styles are shown; specifications, dimensions and working pressure ratings included. Barco Mfg. Co.

138 Small Steam Trap—Bulletin 351 describes an industrial steam trap in sizes from ¼ to ⅜ in. for pressures to 200 lb, and recommended for individual drainage of small pieces of steam-using equipment. Tells how trap is built, how it works; gives prices, dimensions and capacity data. W. H. Nicholson & Co.

139 Compound Steam Traps—Bulletin 215, 8-pp, covers purpose, operation, physical data, capacities, installation and prices of manufacturer's piston-operated compound traps. These traps are suggested for use on equipment producing very large amounts of condensate—purifiers, separators, evaporators, large storage type hot water heaters. Armstrong Machine Works.

140 Thread Manual—Catalog C-32 is a 24-pp booklet covering design information, gaging information and specifications for the three major standard pipe thread systems, as well as specifications for taper and straight pipe taps, thread plug and ring gages and plain plug and ring gages. Tabular matter includes basic pipe thread dimensions common to American Standard, American Standard Dryseal and Military Aeronautical pipe threads. Suggested tapping and gaging procedures included. Detroit Tap and Tool Co.

142 Line Type Purifiers—Bulletin 501, 8 pp, is well illustrated and tells how company's mechanical separators save money by cleaning up steam, vapor, compressed air and gases by removing practically all dirt, solids, moisture, guck and other objectionable entrainment. Photos show equipment arrangement and blueprint drawing shows piping layouts. Includes prices. The V. D. Anderson Co.

143 Plumbing, Heating Supplies—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated, gives sizes, intended uses and necessary ordering information for items cataloged. J. A. Sexauer Mfg. Co., Inc.

PUMPS, COMPRESSORS

145 Small Vertical Pumps—Construction features of small vertical pumps for sidewall or submerged mounting are described in Bulletin 52B6975A, 8-pp. Units covered are available in capacities to 250 gpm at heads to 125 ft for coolant circulating and air conditioning. Curves and tables to determine motor frame, horsepower, speed and current characteristics included. Allis-Chalmers Mfg. Co.

146 Vertical Pumps for Volatile Fluids—This 6-pp bulletin describes advantages of company's vertical turbine pumps for handling gasoline, diesel fuel, crude oil, L-P gases, ammonia and other volatile. Illustrated with cross-section drawings. Johnston Pump Co.

147 Rotary Pumps—Eight-pp Catalog 952 offers application and ordering information on rotary pumps in capacities to 1000 psi. Fully illustrated, includes photos and dimensional drawings along with construction details. Explains design principle involving only two moving parts, tells operational advantages. Geo. D. Roper Corp.

148 Rubber Lined Pumps—Bulletin WQ-212 is devoted to rubber lined pumps for chemical and process applications. These pumps are designed for handling many strong acids and corrosive salts. Bulletin includes specifications, dimensions, sectional and external views. Warren Steam Pump Co., Inc.

149 Compressor Data Book—Bulletin M-70 is a 44-pp illustrated booklet of engineering information on manufacturer's line of reciprocating compressors from 100 to 5000 hp. Provides basic application data with design specifications covering the Types EM, FM and JM multi-stage and multi-cylinder units. These compressors are designed for a broad range of industrial air compressing and chemical processing operations. The Cooper-Bessemer Corp.

MECHANICAL POWER TRANSMISSION

150 Speed Reducers—Catalog 45-C, 8-pp, covers manufacturer's Type S worm gear speed reducer made with a horizontal worm at bottom, worm at top or vertical drive. Gives general specifications, rating tables, dimensions and prices for the speed reducers which come in 24 sizes, in ratio ranges of 5.66 to 1 and from 0.04 to 15 hp. D. O. James Gear Mfg. Co.

151 Improved Grommet V-Belt — The Texrope, a grommet V-belt engineered for longer service, cooler running, less slip and stretch, is described in Bulletin 20B6497A. Cross section drawings show how this belt provides higher gripping pressure under all load conditions; text describes its no-splice construction. Allis-Chalmers Mfg. Co.

HEATERS, HEATING

152 Unit Heater Ratings—Btu output ratings for various models of 30 makes of unit heaters are listed in 8-pp Bulletin 231. Tells how to figure condensing rates, how to select unit heater traps and gives hints on unit heater trapping. Includes tables for selecting traps for constant pressure and variable pressure operation, a table of constants for determining output of heaters at other than standard steam pressures and entering air temperatures, and chart for finding outputs at various fan speeds. Armstrong Machine Works.

153 Electric Heaters—Comfort heaters of many types, sizes and ratings are described in 8-pp illustrated Catalog D-52. A selector chart shows how to calculate heat requirements for given areas and types of building construction. Some 75 models are listed, including convection and radiant heaters in ¼-to 100-kw capacities, types suitable for heating anything from a small office to a shipping dock. Edwin L. Wiegand Co.

154 For Heating Liquids—Discussing submerged combustion as an improved means of heating corrosive or other liquids, this 6-pp booklet explains how the method saves fuel and corrosion losses, and tells where it can be profitably applied. Shows equipment used, explains how it operates. Submerged Combustion Co. of America.

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VENTILATING, DEHUMIDIFYING AND DUST CONTROL

155 For Efficient Air Distribution—Bulletin F 4471-1 describes grilles and registers and ceiling outlets, giving application information and discussing design advantages. Illustrated with photos, dimension drawings. Air Distribution Div., Barber-Colman Co.

156 Vaneaxial Fans—Bulletin J-611 is a 16-pp booklet presenting company's Axivane Series 1000 fans. Explains advantages of vaneaxial design and the versatility afforded by adjustable blades for ventilating and other industrial applications. Fans in this line consist of 126 models from 18 to 84 in. dia., volumes to 150,000 cfm. Photos of typical installations included. Specifications tables showing volume and pressure capacities and physical dimension components provided. Joy Mfg. Co.

157 Tubing for Many Jobs — Flexible tubing for ventilation, fume and dust removal as well as materials handling is described in 8-pp Catalog C2-4. Gives detailed information on company's Spiratube A and Spiratube B, two types of lightweight tubing made from continuous helical coils of spring wire wound with overlapping plies of fabric. Gives applications and features of both types. Also covers a smaller-diameter tubing. Includes specifications, air friction charts, data on oil resistance. Flexible Tubing Corp.

158 Surface Dehumidifier Units—Catalog 1660, 32-pp, giving the story on surface dehumidifiers, provides construction details and discussion on how surface cooling and evaporative cooling are put to work. As a selection aid, a set of typical specifications is presented, also procedure for determining size, giving formulas, psychometric and coil data necessary to the calculations. Catalog also gives information on installation and erection. Sturtevant Div., Westinghouse Electric Co.

159 Industrial Dust Collection — Brand new Bulletin 900 is a 40-pp illustrated booklet giving technical information and data on the solution of dust collecting problems. Discusses dust control and dust recovery and tells how company's equipment is designed to handle both. Descriptive information and specifications are provided on multi-bag types for general industrial use, types for heavy-duty and super heavy-duty applications, filters for source control from isolated operations, and cyclone-type units. Dracco Corp.

160 Money-Saving Standard Units—This pocket-size 16-pp booklet stresses economy of company's standard units for blast cleaning and dust collecting. Booklet has two front covers: one opens into the blast cleaning pages; turning booklet upside down puts dust collection section in reading position. Each section lists applications, recommends equipment and shows various models. Pangborn Corp.

161 Electronic Air Cleaners — Catalog E-60 is a 12-pp booklet on electronic air cleaners. Contains history, principle of operation, aerosol chart, filter test methods and engineering data. Trion, Inc.

METALS

162 Stock List-Calculator—A new help to stainless steel buyers is this 102-pp stock list with bound-in slide-type calculator for converting pricing code numbers on steel items listed into current prices in all quantity brackets. Booklet is well illustrated, thumb indexed. A time saver in arriving at current prices, it also provides a simple way to keep the stock list current. Available to qualified plant engineers. Chicago Steel Service Co.

164 Guide to Steel Selection—This bulletin covers in condensed form the characteristics, mechanical properties and uses of a comprehensive list of hot rolled and cold finished carbon and alloy steel bars. Compiled to make comparisons of the different types quick and easy, it serves a convenient guide to choice of suitable qualities of bar steel. Joseph T. Ryerson & Son, Inc.

OTHER EQUIPMENT

166 Tape Use Manual—Now available to qualified plant engineers is this manufacturer's standard industrial classification manual, approximately 80-pp. Contains 21 major group classifications, 175 detailed industry classifications and some 1500 specific uses for industrial tape. It constitutes a basic guide to tape usage. Polyken Industrial Tape Dept., Bauer & Black.

167 For Quick Copies—Booklet A-2042 describes and pictures this company's Model 14 Copyflex machine designed to copy any size office form in seconds, doing the entire copying job within itself. Explains ease and convenience of operation, economy. Charles Bruning Co., Inc.

168 Why Modular Furniture—Now available to plant engineers is a 6-pp report on the use of modular office furniture in creating man-hours and space. Specific case histories are given. Keystone of the system described is a range of modules affording 100,000 variations to fit individual office needs. Korda Industries.

169 Process Equipment—Twelve-pp General Catalog 12 covers dry blending, process and heat exchange equipment. Stresses company's twin-shell dry blender. Provides characteristics, application information, capacities, power requirements and other data for twin-shell, double-cone and ribbon blenders; kettles, evaporators, stills, agitators, autoclaves, pilot-plant units; heat exchangers. Patterson-Kelley Co., Inc.

170 Inert Atmosphere Generator — The applications, and features of an inert atmosphere generator are given in illustrated Bulletin 1-552. Provides dimensions, operating cost data and flow chart. Also describes auxiliary equipment available to provide a complete inert atmosphere systems. Gas Atmospheres, Inc.

171 Adhesives and Coatings—Up-to-date uses for adhesives, coatings and sealers are shown in this 8-pp booklet. Describes and pictures 25 industry-wide applications for the materials, including adhesives for holding plywood to metal, rubber to metal, and vinyl to wood; coatings for anti-corrosion protection, sealers for fuel tanks. Also gives technical data on company's products. Adhesive & Coatings Div., Minnesota Mining and Mfg. Co.

172 Non-Segregating Coal Distribution—Form 73, 8-pp, explains theory of company's Conical non-segregating coal distributor and shows how it prevents coal segregation. Provides photos of installations with many types of stokers, also photos of accessories for use with the distributor. Stock Equipment Co.

173 Industrial Incinerators—This folder describes and pictures incinerators for industrial and commercial use. Gives information on their installation and operation, as well as on automatic controls and special equipment. Winnen Incinerator Co.

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DATA FILE of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided on pages 35-36 and 165-166.

HEATING, COOLIING

201 Heat-on-Wheels for Industry—Illustrated Form 3574, 16 pp, is the story of how manufacturer's portable heaters can solve emergency heating problems. Shows how these heaters provide extra heat for the hard-to-heat spots, and for extra cold areas, to spot heat where needed, and for ventilating, drying and thawing jobs. Herman Nelson Div., American Air Filter Co., Inc.

202 What Unit Heaters Can Do—Featuring many photos showing how unit heaters are being used to provide heating comfort, cut fuel costs, provide economical air circulation, 8-pp Bulletin 149-A discusses advantages of these heaters and includes performance data. Modine Mfg. Co.

203 Propeller Fan Unit Heaters—Twelve-pp Bulletin 1301 shows how unit heaters can solve many a space heating problem. Both horizontal discharge and vertical discharge units are covered, and outstanding construction features detailed. Suggestions on where to place heaters provided, also basic capacity data. C. A. Dunham Co.

204 Heat Transfer Equipment—An excellent source of information on shell and tube heat transfer equipment, 28-pp Catalog DM-1150 covers heat exchangers, tank suction heaters, oil preheaters, condensers, evaporators, after-coolers, gas coolers, centrifugal pumps and water heaters. Instructions for installation, operation and maintenance are included. Bell & Gossett Co.

205 Heating, Air Conditioning Book—Bulletin PB-290, 36 pp, is a complete, condensed catalog covering company's full line of air conditioning, heating, ventilating and heat transfer equipment. Supplements some 40 specialized bulletins on various product lines. The Trane Co.

206 Faster Tank Heating, Cooling—Bulletin IP-250, 8 pp, describes company's Platecoils, embossed metal sheets welded to form compact units through which required heating, or cooling, medium is circulated under pressure. Explains lower costs, faster tank cooling or heating, lighter weight and compactness of these units. Kold-Hold Mfg. Co.

207 Industrial Dry Coolers—Illustrated Bulletin DC-50, 12 pp, presents dry cooling equipment for small, "in-between," and heavy-duty cooling jobs and includes three recent models. Two are small "portable" units and the third a medium-size unit. Although designed primarily for cooling engine jacket water, they can be used for cooling natural gas, lube oils, fluids of refining stages. The Marley Co., Inc.

208 Jacket Water Coolers—Illustrated Catalog 1351 describes a line of engine jacket water coolers described as extremely rugged units capable of withstanding abuse of portable equipment installations. Details new design features of the units. Young Radiator Co.

VENTILATING, DEHUMIDIFYING, AIR CONDITIONING

209 How Conditioning Units Can Help—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.

210 Putting Air to Work—Catalog 600 is an excellent, 60-pp reference text on air and products to put it to work. For plant engineers concerned with heating and ventilating of plant areas; air conditioning installations; means of exhausting fumes, gases and dusts; conveying chips and granular materials; elimination of airborne dirt—this book is a valuable tool. It's packed with information on selecting and applying equipment, and there is a section of frequently-used reference data. Sturtevant Div., Westinghouse Electric Corp.

211 Fans and Blowers—Illustrated Catalog 21A, 64 pp, gives ordering information on company's fans, blowers, roof ventilators and related products, including application suggestions, ratings, dimensions. Explains principle of curved orifice air-seal ring incorporated. Provides directions for installation and operation, maintenance and lubrication. Hartzell Propeller Fan Co.

212 Efficient Dehumidifying—Bulletin 222 is the 32-pp recent edition of company's popular booklet showing how modern dehumidifying equipment solves moisture problems for industry. Illustrated by 70 photos and diagrams of installations, describes many production, handling and storage problems solved by installing manufacturer's Lectrodryers. Covers their use in storage areas, in materials handling, spot drying. Pittsburgh Lectrodryer Corp.

213 Air Filtering Costs—"A Comparative Study of Air Filtering Costs in Central Systems" describes a study made for the purpose of clarifying costs of air filtration, particularly as between cleanable units and replacement-type air filters. Gives data on factors for cost analysis—original equipment, maintenance and over-all cost. Air filters for central system installation are described and pictured. Owens-Corning Fiberglas Corp.

PUMPS, COMPRESSORS

214 Centrifugal Pump Handbooks—Two instruction booklets covering installation, operation and repair of company's single-stage single-suction and multi-stage centrifugal pumps are available. They include illustrated description of such late developments as Magic-Grip couplings, universal joint couplings with Magic-Grip busnings, mechanical seals. Suggest regular inspection procedures and include pages for maintenance records. Also provide handy reference tables explaining how to locate trouble and listing causes and cures. Bulletin 08X7813, 24 pp, covers single-stage pumps; Bulletin 08X7780 48 pp, covers the multi-stage pumps. State choice or both. Allis-Chalmers Mfg. Co.

215 Installing a Pump—Blaming many pump operating troubles on improper pump selection and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled, "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illustrated. Viking Pump Co.

216 Data on Pumps—This 12-pp condensed catalog covers turbine-type and centrifugal pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

217 "A Turn for the Better"—Bulletin 30-B, 8 pp, discusses manufacturer's improved Moyno pump, explaining in detail its progressing cavity feature and showing how the rotary motion created provides continuous flow at positive pressure. Stresses performance advantages of the pump. Pump Div., Robbins & Myers, Inc.

218 Condensed Pump Data—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications, and features. Goulds Pumps, Inc.

219 Rotary Pump Service Manual—The installation, operation and maintenance of rotary pumps are covered in 12-pp Service Manual 100-2. Subjects discussed include installing of foundation bolts, alignment, supporting vertical pumps, grouting, piping, suction lines, hot liquid pumps, rotation, packing, dismantling, reassembly starting operation and standing idle. Warren Steam Pump Co., Inc.

220 Air Compressor Selection Data—Factors to be considered in selecting a compressor are discussed and selector charts provided in 20-pp Bulletin IDC 9302-3, covering manufacturer's Y and G air compressors. The Y line includes tank mounted and bedplate units, single- and two-stage types. Special features of each model are described, dimensions and ratings given. Westinghouse Air Brake Co.

221 Compressor Selection Chart—Based on normal applications handling air with atmospheric intake pressure, this chart simplifies selection of proper size compressor, giving quick comparison between discharge pressure pounds per square inch gage and piston displacement cubic feet per minute. The chart shows recommended compressor bore and stroke in inches. Worthington Corp.

222 Multi-Stage Compressors—Featured in 36-pp Bulletin 116 is a presentation of engineering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centrifugal compressor applications. Clark Bros. Co., Inc.

223 Centrifugal Compressors—Twelve-pp Bulletin 109 describes and pictures single-stage centrifugal compressors for delivering large capacities of pulsation-free air or gases. Their functions, applications, ratings, construction features, arrangements and methods of control are presented. American Blower Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

224 Efficient Flow Control—Data on bronze, iron, steel and corrosion-resisting valves in a wide range of types, for oil, water, gas and low pressure steam. Shows how valves are designed for service, low maintenance. The Wm. Powell Co.

225 Iron Body Gate Valves—Bulletin 805, 8 pp, covers company's popular iron body, bronze trim gate valves in both outside screw and yoke and non-rising stem types, telling best applications for each. Design features explained. The Ohio Injector Co.

226 Small Steel Valves—Illustrated Circular 134 describes a line of small cast steel valves for high pressure service. Tells how valves are built, where to use them. Gives dimensions, weights, prices on both globe and angle types. Walworth Co.

227 Automatic Valves—Pressure, flow, and liquid level controls for steam, air, gas and fluids are shown in 90-pp Catalog A-50. Includes sizes, prices, capacity charts, conversion tables. Davis Regulator Co.

228 Valve Maintenance Guide—"Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

229 Regulating Valves—Bulletin 313 describes double seated diaphragm regulating valves for use with control instruments, outlining special features of the valves, particularly the "flow line" contoured body designed to provide high capacity at low pressure drop. Leslie Co.

DATA FILE

(BEGINS ON PAGE 167)

230 Reducing Valve Engineering Data—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straight-line flow, tight closing. A. W. Cash Co.

231 Solder Joint Valve — Bulletin 103 describes a 100-lb valve for use with copper tubing. Gives working pressures, temperatures. Tells how to install a solder joint valve. The Kennedy Valve Mfg. Co.

232 Steam Trap Reference Manual—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure traps sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

233 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

234 Steam Trap Book—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

235 Solving Steam Trap Problems—This popular 36-pp catalog on steam traps contains specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps and service them. The V. D. Anderson Co.

236 Steam, Air and Gasoline Traps — Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.

237 Steam Trap Selection — Twenty-pp Catalog 600 provides practical selection information on bucket type steam traps, float and thermostatic types, compressed air traps, air eliminators and strainers. Explains how basic design principle of company's Airxpel traps fulfills requirements of a good trap. Wright-Austin Co.

238 Manifold Discharge Piping Application—Manual 51-B, 34 pp proposes an approach to design of discharge header systems based on partial or complete elimination of back-pressure effects on tied-in safety-relief valves. This principle is claimed to offer great savings in cost of discharge piping. Farris Engineering Corp.

239 Industrial Gaskets — This recently published 50-pp catalog covers an extensive line of gaskets and teflon products, including practically all types of metal, metal-asbestos and special gaskets as well as teflon packing and expansion joints and teflon stock. Includes both engineering and ordering data, application and installation tips. United States Gasket Co.

240 Piping Pointers—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.

241 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commercial steel pipe. Tube Turns, Inc.

242 Handbook on Fittings, Flanges — Catalog wf-1950, 68 pp offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

243 Packless Expansion Joints—Bulletin 35-51A offers 28 pp of up-to-date information on company's Corruflex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

244 Unions and Fittings — Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees and fittings. Dart Union Co.

245 Steel Unions — This catalog sheet describes and pictures several types of steel unions, telling applications of each and listing sizes, prices. Clayton Mark & Co.

MECHANICAL POWER TRANSMISSION

246 Variable Speed Control Simplified—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co.

247 V-Belt Drive Design Book—Providing 54 pp of engineering data on manufacturer's Bull Dog belts, this catalog gives general drive information as well as simplified methods of selecting V-belt drives, V-flat drives and several types of non-standard drives. Includes selection tables, prices. Boston Woven Hose & Rubber Co.

248 Improved V-Belts — This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

249 Chart on Belt Care—In the interest of conserving power transmission belting, this manufacturer offers a cardboard wall chart on the care and maintenance of power driven belts. Carries sketches and brief text covering the steps to be taken to select the right belt, install it, use it correctly and keep it in good operating condition. Cling-Surface Co.

"I painted the skylight, like you asked, Chief, but then the overhead structure got messed up and I thought we might as well paint the boiler, too."

250 Manual on Power Transmission Machinery—Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering data, formulas. Dodge Mfg. Corp.

251 Belts to Suit the Job—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and conveying and general power transmission applications as well as special jobs. Imperial Belting Co.

252 Brakes and Brake Motors—Construction advantages of company's brakes are featured in illustrated Bulletin SL-610-1 on brakes and brake motors. Dimensions, mechanical and electrical characteristics. Crocker-Wheeler Div., Elliott Co.

253 Power Drive Handbook — Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

254 Oilless Bearings for Conveyors — Technical Catalog 210, 20 pp, gives detailed information for specifying, installing and use of bearings for screw and roller conveyors, together with operating characteristics. The sectionalized catalog provides tabular data and dimensional drawings to facilitate identification of bearings for replacement. Arguto Oilless Bearing Co.

255 Hydraulic Drive—The Hydro-Sheave, hydraulic power transmission unit, designed for immediate application to electric motors and internal combustion engines in ¾ to 40 hp range is described in illustrated Bulletin 145-B. Tells how unit offers operators of small power units a low cost conversion device as easily applied as a sheave. Twin Disc Clutch Co.

MATERIALS HANDLING

256 For Efficient Overhead Handling — Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. Includes layout information. The American MonoRail Co.

257 Data on Tramrail Equipment — Twelve-pp Form 2008F is a recently revised booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

258 Handbook on Overhead Conveying Systems — Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering data. Richards-Wilcox Mfg. Co.

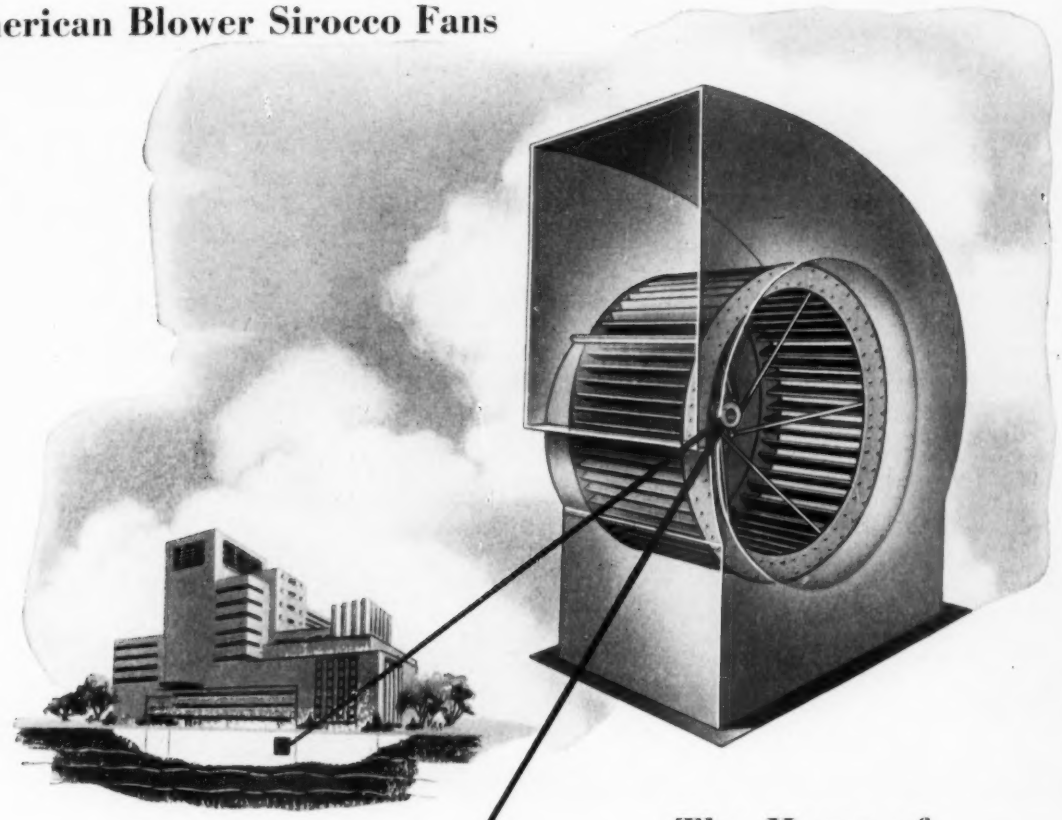
259 For Overhead Handling—This 12-pp illustrated catalog covers motorized and hand operated cranes and monorails engineered for efficient, low-cost handling. Special construction features are detailed; accessory equipment shown. Abell-Howe Co.

260 Conveyor and Elevator Belts — This 26-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses increased service life and decreased maintenance. The B. F. Goodrich Co.

261 Metal Conveyor Belts—This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

262 Feeders, Conveyors — An excellent presentation of electric vibrating feeders and conveyors is given in 90-pp Catalog 830 covering manufacturer's line of equipment for handling a wide variety of wet and dry materials and including large and small capacity units, for temperatures

American Blower Sirocco Fans



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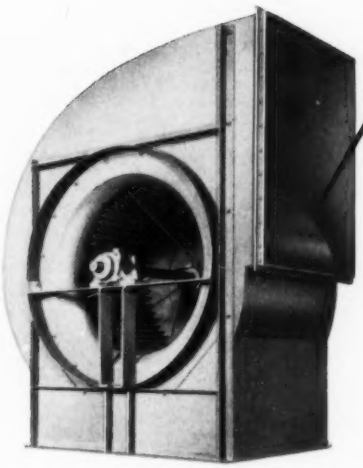

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67	O.S.&Y. Screwed	2½" to 12"	Cold Water, non-shock, 175 lbs.
68	O.S.&Y. Flanged	2½" to 14"	2½" to 12"—Cold Water, non-shock, 175 lbs.; 14"—150 lbs.
681	O.S.&Y. Bell Ends	4" and 6" to 14"	Same as Fig. 68
701	Indicator Post Gate Valve—Flanged	4" to 14"	4" to 12"—Cold Water, non-shock, 175 lbs.; 14"—150 lbs.
702	Indicator Post Gate Valve—Screwed	4" to 12"	Cold Water, non-shock, 175 lbs.
70	Indicator Post Gate Valve—Bell Ends	4" to 14"	Same as Fig. 701

BRONZE VALVES

66	O.S.&Y. Wedge Disc Gate Valve	¾" to 2"	Cold Water, 175 lbs.
38	Hose Gate Valve no cap and chain	2½"	Cold Water, 175 lbs.
39	Hose Gate Valve with cap and chain	2½"	Cold Water, 175 lbs.
93	Angle Hose Valve	2½"	Cold Water, 175 lbs.
935	Angle Hose Valve	2½"	Cold Water, 300 lbs.

IRON BODY CHECK VALVES

125	Screwed Check Valve	4" to 6"	Cold Water, non-shock, 175 lbs.
126	Flanged Check Valve	4" to 12"	Same as Fig. 125
127A	Bell-end Check Valve	4" and 6" to 12"	Same as Fig. 125

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DATA FILE

(BEGINS ON PAGE 167)

of -30 to 2000 F. Explains principles of design, operations. The Jeffrey Mfg. Co.

263 **Fastenings for Conveyor Belts** — This collection of data covers hinged fastenings, repair plates, lacings, hooks, round belt couplings, also lacers, cutters. Gives instructions for use. Armstrong-Bray & Co.

264 **Pneumatic Conveying** — Technical information and data on handling bulk materials with company's Airstream conveyors are presented in 24-pp Bulletin 529. Diagrams basic types, charts principal applications. Includes case history studies in various industries. Dracco Corp.

265 **Conveyors for All Jobs**—Catalog 400, 24 pp, presents application information and design details on a complete line of conveyors. Covers roller, wheel and belt types, elevating equipment, cable and chain trolleys, drag line conveyors, bulk handling equipment and special purpose conveying equipment. The E. W. Buschman Co., Inc.

266 **Trucks, Handling Equipment**—Bulletin 170A gives an over-all picture of company's portable and hydraulic freight elevators, other equipment. Revolvator Co.

267 **Data on Truck Casters** — As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.

268 **Trucks, Casters, Wheels** — Catalog 50, 65 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

269 **Industrial Truck Reference Guide** —Bulletin 300, 44 pp, covers company's line of current model tractors, trailers, fork lift trucks, platform lift trucks and load-carrying trucks. Major categories are: the trackless-train system; the fork-truck pallet system; and the lift truck-skid system. Each category is preceded by an analysis of applications and merits of the handling system. Mercury Mfg. Co.

Postage-free Reader Service Cards make it easy to order any of this literature. See pages 35-36 and 165-166.

270 **Shovel and Loader** — Described in 12 pp Bulletin 1032 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

271 **Materials Handling Equipment** — Illustrated Catalog P602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. The Yale & Towne Mfg. Co.

272 **Industrial Logistics** — Form A-9516-4450 is a 12-pp booklet covering strategic handling of materials from raw state to distribution. Discusses master unit load and transportation cycle. Explains company's system of adapting all loads to four types of containers, assembling maximum

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■ The bonded metal brake linings of the C-W brake give greater friction for quicker stops, greater wear resistance, complete immunity to climatic conditions, oil or grease, and long service with no change in retarding torque.

The unusually short overhang of the C-W brake provides maximum rigidity and the compactness that adapts it to limited space — a vital feature on machine drives. The magnetic action which releases the brake is instantaneous and powerful. The entire mechanism is completely enclosed in an easily removable cover.

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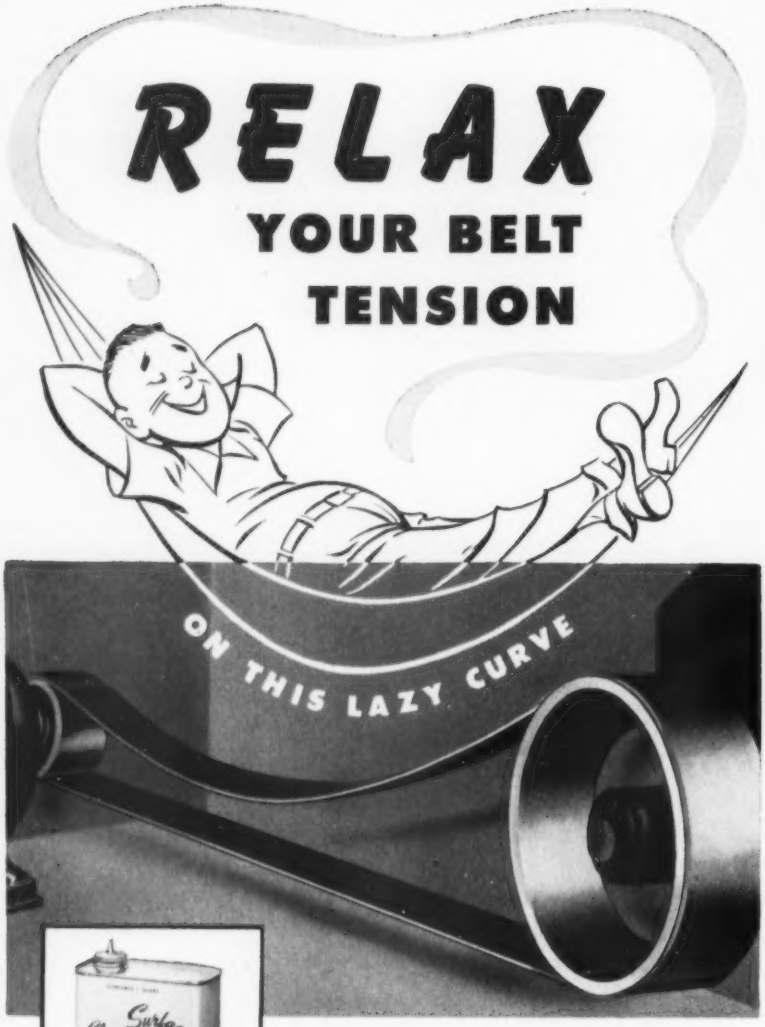

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DATA FILE

(BEGINS ON PAGE 167)

numbers of these into master unit loads, and transporting them as single units. The Elwell-Parker Electric Co.

273 Safe Truck Operation — "Safety Saves!" is a 24-pp booklet setting forth "do's" and "don'ts" established as a practical code of truck operation. The admonitions, pointed up by cartoons, serve as both "refresher course" and text. Industrial Truck Div., Clark Equipment Co.

274 Stand-Up Fork Lifts — Complete specifications are available on stand-up fork lift trucks in 2000- and 3500-lb capacities. These trucks feature easy maneuverability and manufacturer's Lev-R-Matic drive. Mobilift Corp.

275 All-Purpose Lifts—"Let Big Joe Do It" is a bulletin on hydraulic lifting units. Features a heavy duty model for lifting loads to 52 in. height. Big Joe Mfg. Co.

276 Hydraulic Lift Trucks—This catalog provides engineering and ordering information on manufacturer's complete Weld-Bilt line of hydraulic lift trucks in 2500- to 10,000-lb capacities. Also covers skid platforms, pallet lift trucks, two-wheel trucks. West Bend Equipment Corp.

277 Fork Lift Trucks—Bulletin 1570, 8 pp, describes the Diesel or gasoline powered FT series of company's lift trucks available in capacities from 3000 to 7500 lb. Partial assembly pictures point out maintenance and control features, and charts show dimensions. The Buda Co.

278 Industrial Lifts—This booklet presents a wide range of elevating equipment designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, truck service lifts. The Wayne Pump Co.

279 Sheet Lifters—Operational and design features of company's sheet lifting equipment which contribute toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Cullen-Friestedt Co.

280 Material Flow Equipment — Revised 28-pp Catalog GC-52 presents conveying equipment, including power and gravity conveyors, hand trucks and industrial casters, with photos, drawings and specifications. New heavy-duty conveyor is discussed, and a belt centering device is detailed. The Rapids-Standard Co., Inc.

281 Portable Hoists — This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions. Keller Tool Co.

282 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

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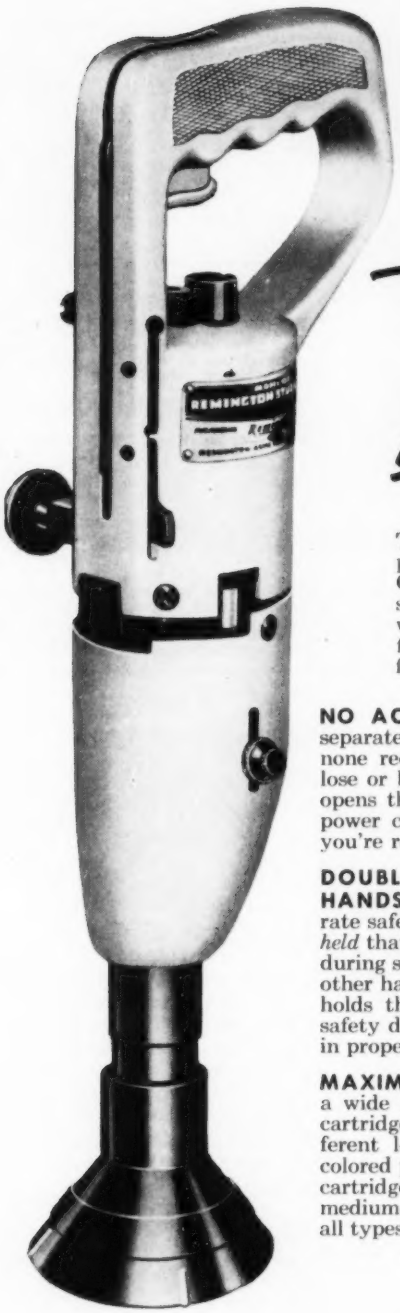

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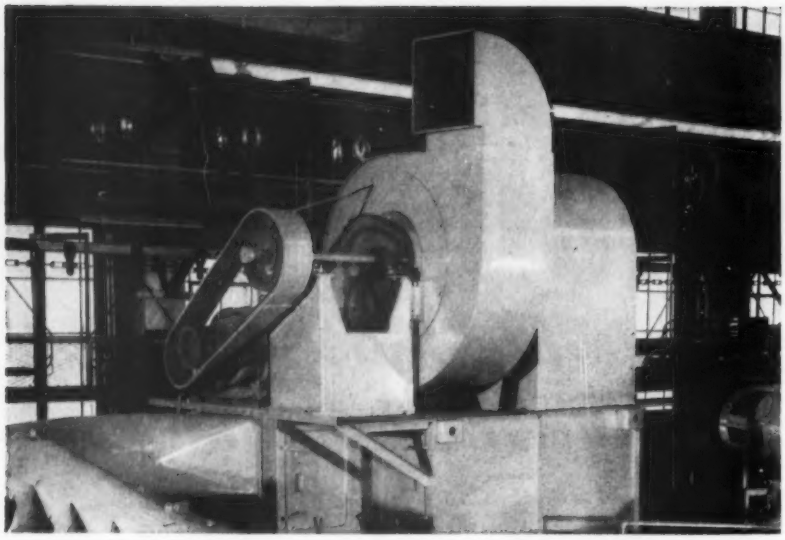

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DATA FILE

(BEGINS ON PAGE 167)

283 Trolley Hoists—Bulletin DH-269, 2 pp describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.

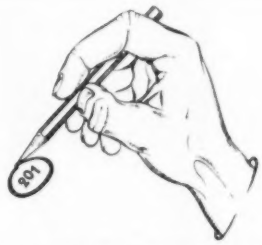
284 Chain Hoists — Catalog 61, 32 pp, covers a line of chain hoists, telling how to select and use them. Provides an illustrated comparison chart of hoist types, a selector table and discussion of factors to be considered in buying a hoist. Multiple gear chain hoists, screw gear chain hoists, differential chain hoists described separately. Reading Crane & Hoist Corp.

285 Manual on Electric Hoists—Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

MAINTENANCE

286 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.

287 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.



The new Reader Service Cards on pages 36 and 166 are easy to use and need no postage. Just circle the item numbers of catalogs wanted, fill in name and company, etc., and drop the card in the mailbox. You'll receive the literature from the manufacturers at no cost to you.

288 What to Do About Sashes—Problems and suggested methods for economical maintenance of steel and wood sash are outlined in "Trouble-Free Sash Maintenance." Subjects covered include importance of making buildings tight and draft-free, comparison of putty and mastic glazing for windows, value of caulking openings between sash and masonry, methods of painting. The Tremco Mfg. Co.

289 Iron Cement Handbook—This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

290 Roofing Manual—Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective

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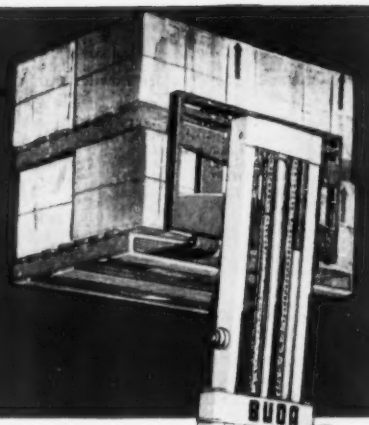
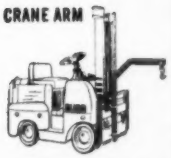


CRANE ARM



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For more facts circle 618 on Reply Card

DATA FILE

(BEGINS ON PAGE 167)

coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.

291 Basic Roofing Information—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also, roofing materials. Johns-Manville.

292 Protective Paints — Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for use on wood, metal surfaces. Cellulose Products Dept., Hercules Powder Co.

293 Floor Maintenance Buyers' Guide—Brief, but practical application details on floor machines and accessories and a wide range of floor cleansers, waxes and other preparations are presented in this illustrated bulletin. Finnell System, Inc.

294 Vacuum of Many Jobs — Bulletin 144, 20 pp, describes and illustrates 132 unusual industrial uses for company's vacuum system. The Spencer Turbine Co.

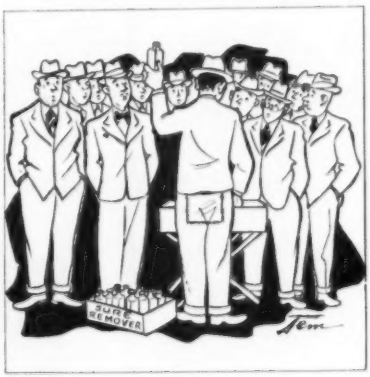
CONSTRUCTION

295 Industrial Steel Windows—Planned to offer comprehensive easy-to-find data, this 24-pp catalog gives descriptions, specifications, sizes, uses and advantages of Fenestra pivoted windows, commercial projected windows, and security windows used separately and in combination, also continuous windows used mainly for top-lighting in monitor and sawtooth roof construction. Detroit Steel Products Co.

296 Technical Manual on Plywood — Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.

297 How to Glaze with Plexiglas—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this plastic sheet and detailed data on installation methods. Plastics Dept., Rohm & Haas Co.

298 Aluminum Building Sheet — Stressing advantages of aluminum for siding and roofing, 12-pp Form AD-247 presents both dimensional data and engineering details covering its use. Provides illustrated suggestions for use of fasteners, flashing details, directions for applying the sheet. Includes tips on painting, welding, storing. Aluminum Co. of America.



"One application — and presto! The shine is gone!"

299 Flooring Guide—Plant engineers interested in specifying resilient tile flooring will find valuable information in Form 107. Tells what each type of resilient tile is recommended and not recommended for. Specific information is given for asphalt tile, cork tile, rubber and grease-proof tiles. Kentile, Inc.

300 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data, sizes, allowable loads. Pictures some applications. Alan Wood Steel Co.

301 How Hardboards Improve Methods—Twelve-pp Form 5202, on production economies in plant maintenance, materials handling and processing, enumerates applications and specifies types and thicknesses of company's Presdwood for specific purposes. Lists 28 advantages of Presdwood, describes its use in architectural applications, bins, utility boards, cabinetwork, containers, booths and ventilators, work surfaces. Masonite Corp.

TOOLS

302 Pipe Tool Book—This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and

Whether heavy-duty or light-duty, high-speed or low-speed, from oil burners and blowers to pumps and agitators, there is a LOVEJOY Flexible Coupling to meet your exact requirements. They offer the best obtainable insurance against alignment troubles —dampen and absorb starting torque, vibration and shock of intermittent loads . . . protect motor and driven machine . . . lengthen bearing life.

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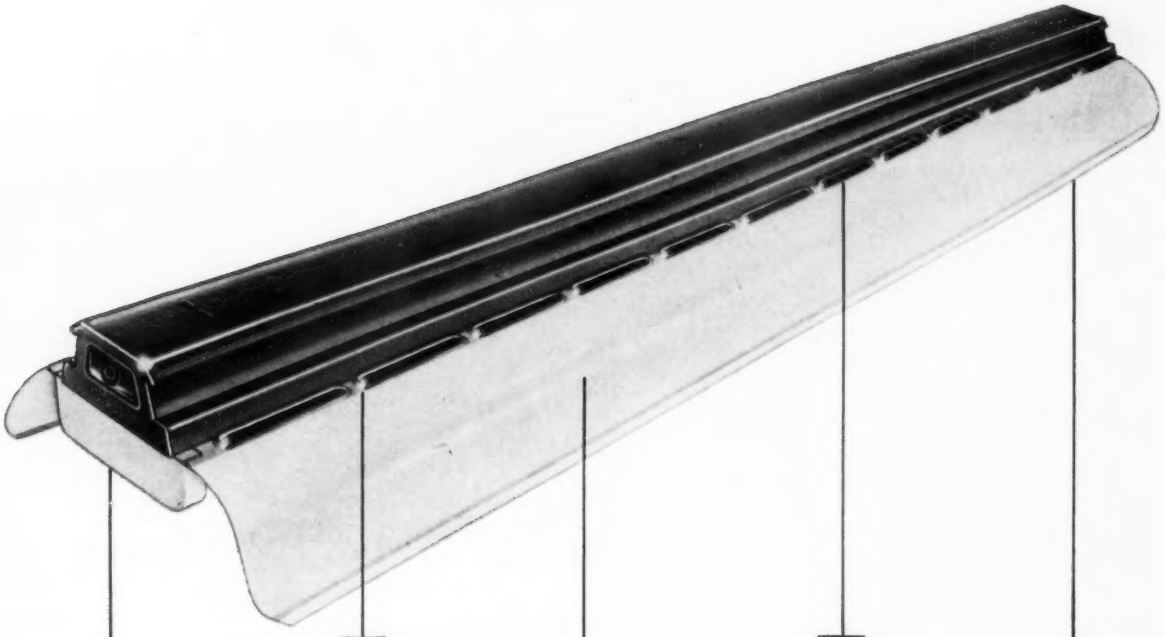

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2 COOLER, CLEANER OPERATION. A gentle flow of air passes through apertures reducing dirt and dust deposits. This "breathing" action keeps fixture cooler, cleaner and more efficient.

3 TURRET* SOCKETS. Sturdy, vibration-proof Turret sockets are standard equipment on all CFI Day-Lines — providing positive lamp seating and simple lamp installation or removal.

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4 ALL-WHITE PORCELAIN REFLECTORS. Outside as well as inside, every inch of reflector surface is finished in snow-white porcelain enamel—providing maximum high reflection surface for greater efficiency.

5 WIPED REFLECTOR EDGES. Excess porcelain enamel is carefully wiped away from reflector edges—an extra operation that eliminates chipping and crazing of the finish at a most vulnerable spot.

6 bonus advantages you get with CFI Day-Line® Industrial fixtures

6 NEW LOW COST. *CFI Day-Line prices are substantially lower because of improved construction methods.* Get the full CFI Day-Line story. Write today for Bulletin OD-568 — the story of COMFORT FOR INDUSTRY at new low prices!

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DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc., 5439 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

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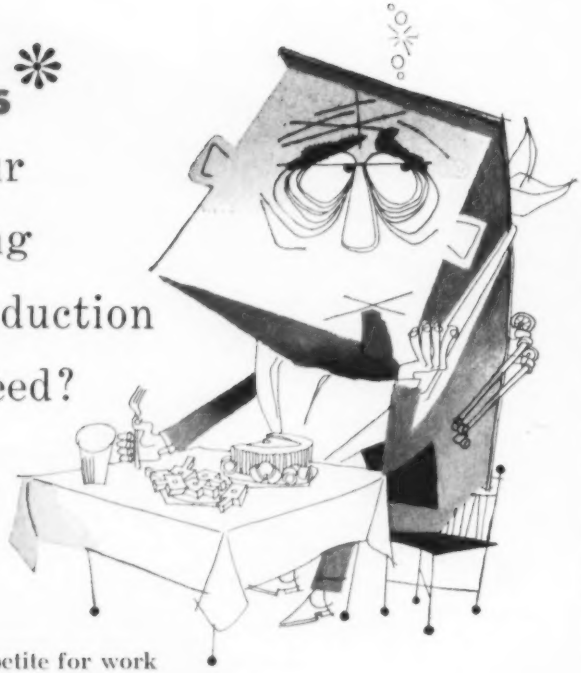
does

coil-itis ✻

have your processing tank production off its feed?



When the appetite for work of your heating and cooling processes diminishes, the trouble may well be coil-itis. For, downtime due to pipe failures and limitations can seriously delay your production flow. Switch to Platecoils, the new tonic for production, as revolutionary as the new wonder drugs. Platecoils take 50% less tank space leaving more room for greater payload. They heat or cool 50% faster. They simplify maintenance and save hours of downtime. Equally important, Platecoils cost as much as 50% less in the first place. Platecoils cure production troubles involving heat transfer and give production a shot in the arm.

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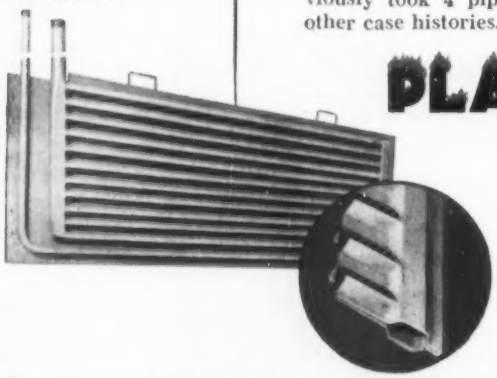
At Sealed Power Corp., installation of Platecoils has completely eliminated a 6-to-8 hour-a-day chipping job. Three Platecoils now heat a tank that previously took 4 pipe coils. Ask about other case histories.



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Coil-itis — Diagnosed as tank heating and cooling problems. Platecoils — the prescription for solving pipe coil problems.

PLATECOIL DIVISION, KOLD-HOLD MANUFACTURING CO., LANSING 4, MICHIGAN

For more facts circle 621 on Reply Card

DATA FILE

(BEGINS ON PAGE 167)

hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.

303 Idea Book — Sixty pages of "1001 Shortcuts" for production, construction and maintenance make this hand-tool and hydraulic-tool handbook one of the most useful ever. Large photos and concise descriptions give ideas developed and successfully applied by hundreds of tool users. One of the big values attached to the "Idea Book" comes from the manner in which it stimulates the user to create his own ideas. Typical job photos suggest the general principles of the applications. Blackhawk Mfg. Co.

304 Metal Spraying Gun — Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallizing Engineering Co., Inc.

305 Pipe Tool Ordering Guide—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives sizes, prices. Armstrong Bros. Tool. Co.

See pages 35-36 and 165-166 for postage-free mailing cards. Use them to ask for bulletins — just circle item numbers of all those wanted.

306 Tube Working Handbook — Form 369-A is a 32-pp booklet on tube working tools. A section on modern tube working practices covers handling, cutting, flaring, reaming, refacing or fittings, bending, soldering and other operations. Company's line of tools is described. The Imperial Brass Mfg. Co.

307 Portable Spray Gun—An easily used and inexpensive spray gun pressurized with a CO_2 cartridge is featured in this single sheet bulletin. Sketches show the gun in use for painting, cleaning, other work. Sullivan-Becker Machine Co.

308 What's in a Hammer?—Form S-46 is a small 16-pp booklet showing what goes into the design and construction of a good hammer. Stanley Tools.

309 Stud Driver—Special operating features of company's Model 450, a self-powered quick fastening tool, are detailed in Form 937A. Photos show how the driver is used and picture it in action. Industrial Tool Div., Remington Arms Co., Inc.

INSTRUMENTS, CONTROLS

310 Fundamentals of Instrumentation—Booklet 80-2, just released, offers 126 pp of information on instrumentation in industry. Separate sections are devoted to the fundamentals of measurement and control, measurement of process variables, remote transmission of measurements, automatic controllers, power units and final control elements, control systems and panelboards. Available to qualified plant engineers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

311 Wide Range Regulator—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

312 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for

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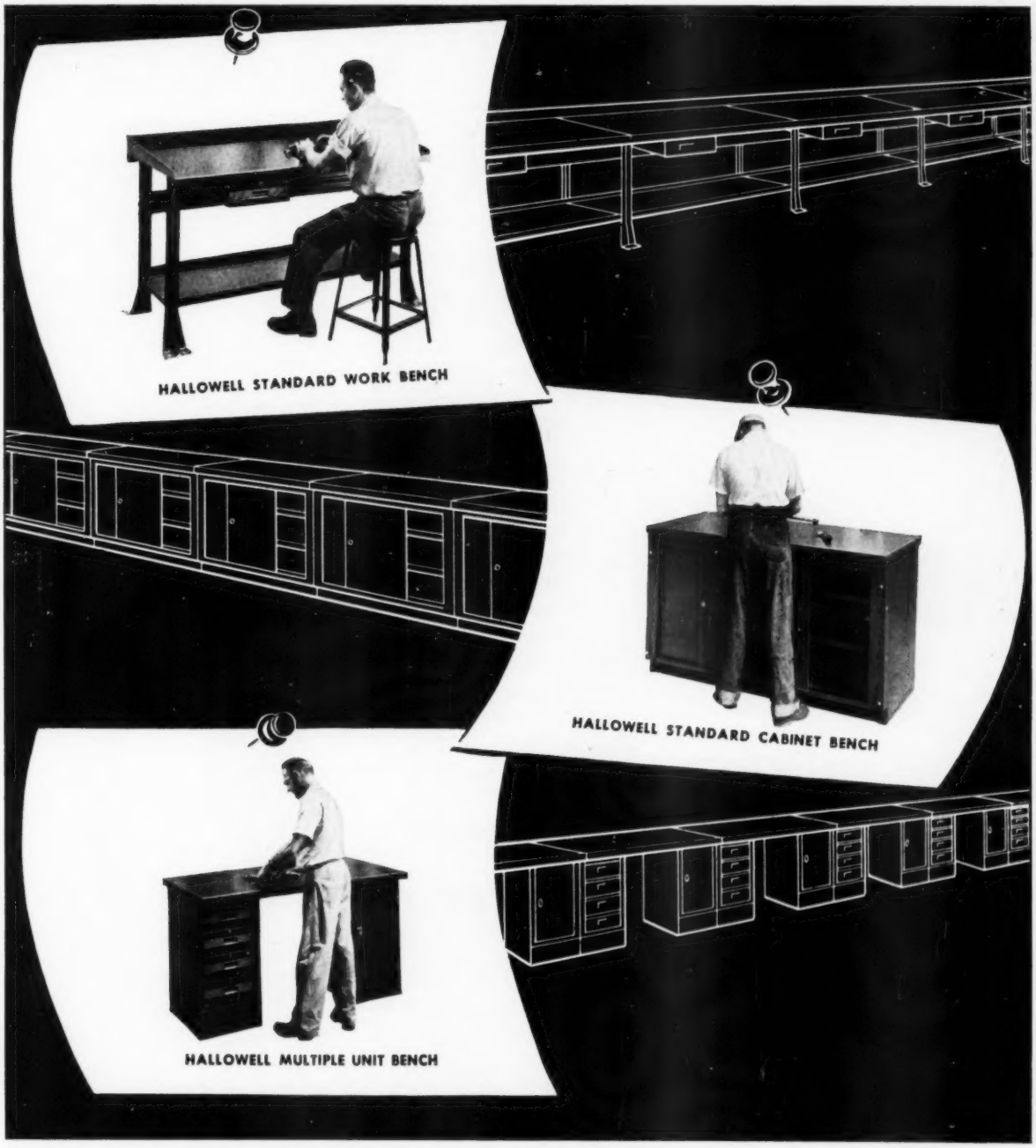
can be installed individually or in continuous line



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JENKINTOWN PENNSYLVANIA

For more facts circle 622 on Reply Card

DATA FILE

(BEGINS ON PAGE 167)

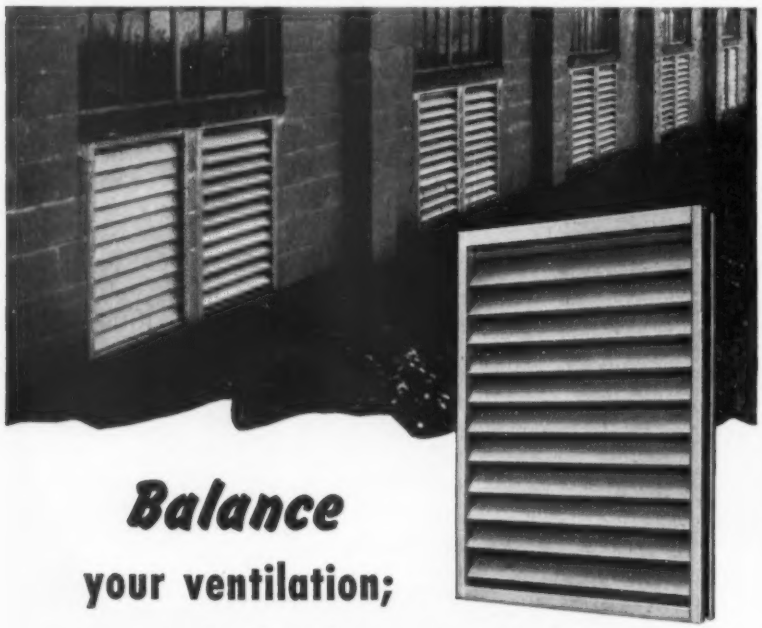
pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. United States Gauge Div., American Machine and Metals, Inc.

313 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature, pressure-low water, liquid level, bottles; transformer-relays, valves. The Mercoid Corp.

314 For Liquids Worth Storing—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

315 Heating-Air Conditioning Controls—A complete and informative ordering book for thermostats, motor-operated valves and accessories for heating, ventilating and air conditioning applications is offered in 48-pp Catalog P-1753-3. Compiled to aid in selection of control equipment to meet rigid specifications. Barber-Colman Co.

316 Electrical Instruments — A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters. Weston Electrical Instrument Corp.



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get ample fresh air intake capacity
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Custom-made for each job *without premium cost*, this weatherproof system provides unusual advantages — has better-than-average free opening area. The wide range of odd-size units available through our unique manufacturing procedure makes easy and economical the filling of any size opening. Overlapping blades are mounted in sturdy formed channel frame. Adjustable style features positive closing and quick change of blade position to any variation between open and closed. Airlouver is made in fixed-blade style also. Write for Bulletin ALO-D.

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Roof Ventilators and Ventilating Louvers
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317 Electronic Control System—Bulletin A-701 introduces company's Autronic system, a miniature all-electronic system for controlling pressure, temperature, flow and level, intended for use in chemical processing plants, refineries, central stations, other applications where fast, accurate control is required. The Swartwout Co.

318 Time Saving Volt-Ammeter—Manual 110, 16 pp, "How to Make Your Job Easier with the Amprobe," describes the handiness of this pocket-size volt-ammeter in installing, repairing, servicing electrical equipment. Pyramid Instrument Corp.

ELECTRICAL

319 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.

320 Motor Control—A handy reference book on modern motor controls, comprises 73 pp of condensed information, dimensions and prices of the most popular items in company's line. Covers a-c manual and magnetic across-the-line switches; a-c voltage starters, control relays and contactors. synchronous and high voltage starters; d-c control relays, contactors, starters; drum switches, a-c d-c rheostats, speed regulators, etc. Allen-Bradley Co.

321 Motor Handbook — Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Wagner Electric Corp.

"I have big plans in mind for you, Munson. Now don't spoil them by asking for a raise."

322 Bus Duct Manual—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, etc. Westinghouse Electric Corp.

323 Plug-In Power — Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.

324 Power Distribution Feeders — Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution systems, gives construction, engineering, application data. Trumbull Dept., General Electric Co.

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You get all you pay for in a Wayne Compressor. Every one is sold on the basis of known efficiency in terms of useable air output—pre-tested and guaranteed. Designed, engineered and built in Wayne plants each compressor is "job-engineered," you are assured of buying guaranteed air output for a specific job.

Wayne Air Compressors are checked for volumetric efficiency, performance and operating tolerances. Inspection standards are high, and units must measure up to rigid requirements. Every working part has been designed for minimum maintenance and low operating cost.

You get every dollar's worth with a Wayne—highest quality, guaranteed air output, nationwide service. Make your next air compressor a Wayne!

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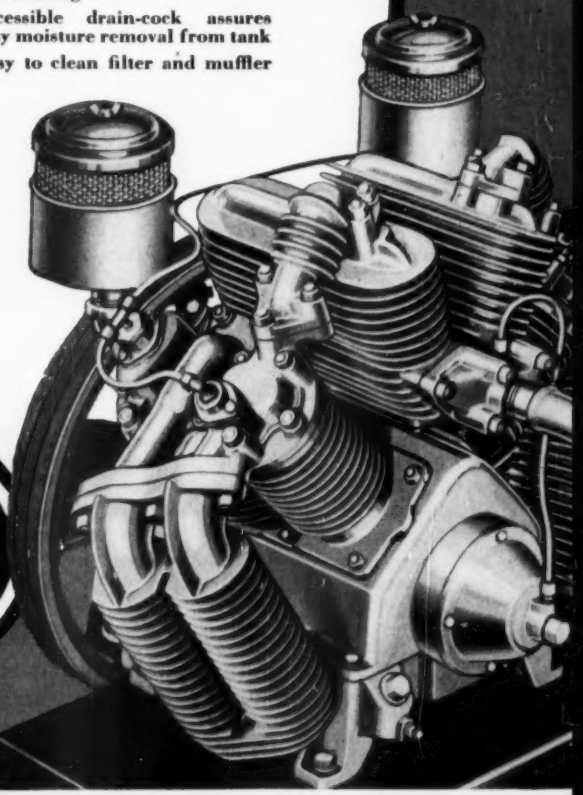

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NATION WIDE SERVICE

INDUSTRIAL LIFTS • HOSE REELS • AIR COMPRESSORS

DATA FILE

(BEGINS ON PAGE 167)

325 Distribution Duct Engineering Data—Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder, circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating diagrams, layout symbols. BullDog Electric Products Co.

326 Retractile Cords—Bulletin KKG describes and pictures some of the applications for permanently coiled, neoprene jacketed electric cords which expand to 5 times retracted length. Koiled Kords, Inc.

327 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

328 Power Circuit Transformers — By means of comparative wiring diagrams, 12-pp Bulletin 501-15 demonstrates the economy and system simplicity afforded through the use of company's power circuit transformers in handling lighting and low voltage features of these dry type transformers, their use in converting old installations, isolating service. Jefferson Electric Co.

329 Automatic Voltage Regulation—Bulletin S-351 provides 12-pp of excellent selection data on company's automatic voltage regulators of the instantaneous electronic and electro mechanical types. Explains principles of operation of both types, their special features and applications. The Superior Electric Co.

330 Snap Action Switches—Catalog 82, 24 pp, on precision snap-action switches, presents safety, limit, and interlock types designed especially for switching a-c circuits in industrial applications. Covers heavy-duty limit switches, metal enclosed switches, some of which are sealed against dirt, dust, splashing. Micro. Div., Minneapolis-Honeywell Regulator Co.

331 Overload Relays — Bulletin 1180-3 is a technical data sheet on overload relays designed to combine advantages of thermal and magnetic tripping characteristics for protecting a-c motors. Pictures design details. The Electric Controller & Mfg. Co.

332 Battery Technology Handbook—This is a 56-pp revised edition of company's manual of technical instruction and engineering data on the care of motive power storage batteries. Major addition is a section on charging, which includes information on modified constant voltage and two-rate charging, boost, equalizing and emerging charging, control of discharge, etc. Other sections cover the theory of the lead-acid battery; practical tips on care and operation; maintenance and repair. Gould-National Batteries, Inc.

You may use the two Reader Service Cards to request information on ads, too. Just circle the key number appearing at bottom of ad.

333 Preventive Maintenance Tips—Booklet B-5477, 28 pp, discusses programs designed to reduce shut-down time on production lines and treats in detail the maintenance of power equipment. A suggested schedule of work and cleaning on power equipment is presented in chart form. Essential information on preventive maintenance for turbines, generators, switchboards, motors and controls given. Westinghouse Electric Corp.

334 Electrical Equipment for Cranes — A complete line of electrical equipment designed exclusively for crane service is presented in 32-pp Bulletin C5-1. Covers everything from company's a-c Magnetorque crane control to current collectors, and in generously illustrated. Overhead Crane Div., Harnischfeger Corp.

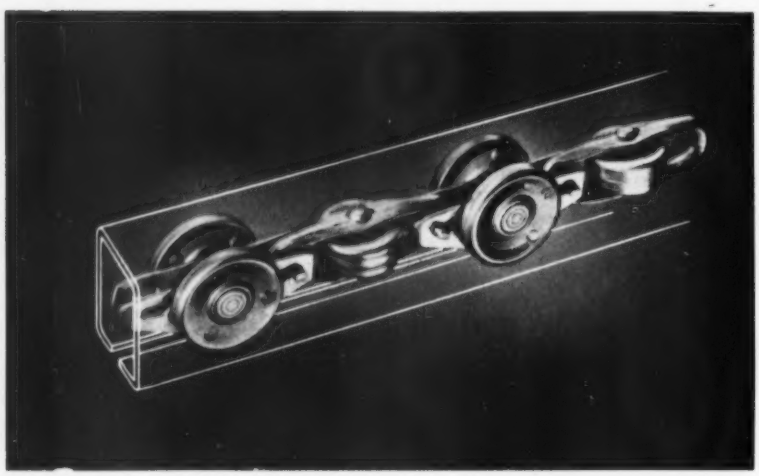
LIGHTING

335 Recommended Lighting Systems — This 16-pp article describes six lighting systems adaptable to most industrial plants. They include systems for illumination levels 20 to 40 ft-c, for levels of 40 to 60 ft-c and for levels of 60 to 100 ft-c, and involve use of filament, fluorescent, and mercury lighting and combinations of these. Explains lighting classifications, and discusses advantages of each type of lighting. Lamp Dept., General Electric Co.

336 Industrial Lighting at Work — Sixteen pp Booklet B-4727 stresses three ways of putting better lighting to work; cutting costs by promoting more production; increasing efficiency by ensuring accuracy, and reducing accidents by exposing dangerous operations. Analyzes mercury vapor and incandescent light sources as to efficiency, service life, maintenance, mounting height and job suitability. Luminaires of each type are pictured; wattage and lumen output ratings. Westinghouse Electric Co.

337 Precision Lamps—Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are briefly discussed. Radiant Lamp Corp.

338 Selection Data on Lighting Fixture Hangers—Catalog 50, 80 pp contains general and detailed information on discon-



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Richards-Wilcox "Zig-Zag" Continuous Power Conveyor is a specially constructed, motor-driven chain that travels through a steel, tube-like track. The unit is continuous; travels up and down, in and around, anywhere in the plant; carrying loads up to 125 pounds at all speeds from 1 inch to 60 feet per minute. Installation is easy and inexpensive, and may be quickly adapted to conform to plant alterations. Among its major advantages, "Zig-Zag" puts "dead" space to work—releases personnel for other duties—increases efficiency and keeps costs down.

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- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
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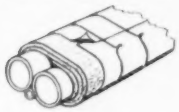
MICROLITE *Glass Fiber Insulating Wool* goes around this air conditioning duct with the greatest of ease. The men simply snip off a section of the feather-light blanket, pull it snugly around the duct, and secure it with glass tying cord. A single, simple wrap-around operation—and the duct is well insulated against heat loss or gain. Microlite comes to you in resilient blankets up to 72 inches wide, 200 feet long, 3 inches thick, compressed in easily-stored rolls.

You can't conscientiously proceed with any insulating job until you've investigated Microlite, a product of Glass Fibers' exclusive electronic-extrusion process. Write for the facts. Glass Fibers Inc., 1810 Madison Avenue, Toledo 2, Ohio.

MICROLITE *insulates effectively against heat transfer.*
MICROLITE *is pleasant to handle, cuts with scissors.*



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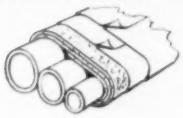
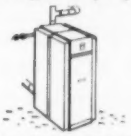
MICROLITE *compresses readily, springs back fully.*



NESTED PIPES



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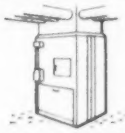

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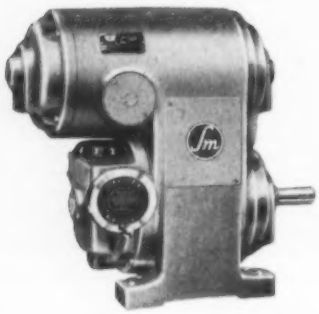
Magnetic Separators More Efficient With Speed-Trols

Speed-Trols give us the infinite and accurate control of drum speed needed to get maximum extraction of ferrous materials with the Magnetic Drum Separators we manufacture... accurate control of drum speed is essential in order to efficiently process materials having a wide range of magnetic response, reports G. Shister, Design Engineer, F. W. Shrader Co., Culver City, California.

STERLING SPEED-TROL



GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

Equipment adaptation to: Sequence synchronization — operators' abilities — load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

Process control of: Temperature — viscosity — level — pressure — flow — etc.

Time control of: Baking — drying — heating — cooking — pasteurizing — soaking — chemical action — etc.

With Speed-Trol you get the maximum in production, plant efficiency, quality & profit.

20-page illustrated catalog... Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. A-430.

STERLING
ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile
Offices and distributors in all principal cities

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DATA FILE

(BEGINS ON PAGE 167)

necting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

339 Plant Lighting Planning Guide — This 32-pp handbook of industrial lighting presents economics of a plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Co.

340 Lighting Fixtures—Full information on company's fluorescent lighting fixtures designed for efficient industrial lighting and reduced maintenance is provided in Form OD-568. Day-Brite Lighting, Inc.

FUEL OILS, LUBRICANTS

341 Cooperative Technical Consultation Service—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.

342 Versatile Industrial Oil — Described in 20-pp Form AD 4078 is an all-purpose oil offering protection for a wide range of industrial equipment, and available in 15 viscosity grades. Discusses six major characteristics of the oil; explains and pictures

HINGED PLATEGRIP
BELT FASTENER No. 500

FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from ⅜" to ½" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

Write for Circular

ARMSTRONG-BRAY & CO.
5398 Northwest Highway · CHICAGO 30, U. S. A.

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LIKE AN
ATOM-IC
EXPLOSION

Just 1/32" (pinhole size) faucet leak
MUSHROOMS into ATOMIC WASTE
of approximately 95,000 gallons • of water yearly—costing:
$24.14
@ $1.90 per M cubic feet

If a hot water faucet, then (actual) FUEL WASTED heating 95,000 gallons costs approximately:

$88.91 if coal (9879 lbs.)†
$91.08 if oil (792 gals.)†
$84.41 if gas (84,411 cu. ft.)†

Above figures authenticated by Hackensack Water Co.* and American Gas Association.†

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with "SEXAUER" "Easy-Tites" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of SCARCE fixtures.

PAT'D.
"EASY-TITE"
FAUCET WASHERS

...a modern laboratory triumph, are compounded from du PONT NEOPRENE (tested up to 300°F.) instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day superheating water systems — that formerly broke down washer's structure.

Built like a tire with fabric re-inforcement they resist the grinding, closing squeeze that SPLIT and MUSH ordinary washers out of shape... causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold FAUCETS—thus you slash water, fuel and labor costs.

THE NEW 'SEXAUER' CATALOG

Edition G, just out, pictures over 2500 TRIPLE-WEAR plumbing REPAIR parts and Pat'd. Precision Tools. It's today's accepted buying guide for discriminating purchasing and maintenance personnel among thousands of top PLANTS, INSTITUTIONS and GOVT. AGENCIES that rely on SEXAUER repair materials. *Send for your copy today!*

Then too, there's a SEXAUER TECHNICIAN within quick call from coast-to-coast, who offers a special SURVEY service that sets up a schedule of the exact replacement parts required for your particular plumbing fixture regardless of make or age and *without obligation.*

A postcard will bring him and your NEW Catalog promptly.

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SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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"We've reduced our scrubbing time from 70 to 7 man-hours ... and our floors have never before been so clean!"

— says Foreman of
BURNY BROS. BAKERY, CHICAGO

Garage and stockroom floors in Burny Bros. large, modern bakery get daily scrubbing with a *Job-Fitted Combination Scrubber-Vac* and *Setol Cleanser*

THEY'RE an unbeatable team to speed the cleaning of oily, greasy floors. *Here's why:* A *Scrubber-Vac* completely mechanizes scrubbing. It applies the cleanser, scrubs, flushes if required, and damp-dries the floor—*all in one operation! Job-fitted* to specific needs, a *Scrubber-Vac* provides the maximum brush coverage consistent with the area and arrangement of the floors. Its teammate, *Setol Cleanser,* is specially designed for the greater speed of *combination-machine-scrubbing* . . . emulsifies grimy oil and grease *instantaneously* for fast, thorough removal by the machine's powerful vac. Moreover, *Setol* retains its strength longer than average alkaline cleansers. This, too, speeds the cleaning process . . . saves on materials . . . and cuts operating time of the machine, which in turn reduces labor costs. The *Scrubber-Vac* shown above is *Finnell's 213P,* for heavy duty scrubbing of large-area floors. It has a 26-inch brush spread, and is capable of cleaning up to 8,750 sq. ft. per hour! *Finnell* makes sizes for small, vast, and intermediate operations (available on lease or purchase plan) . . . also a full line of fast-acting cleansers. In fact, *Finnell makes everything for floor care!* Find out what *you* would save with *combination-machine-scrubbing.* For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 5301 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.
Originators of Power Scrubbing and Polishing Machines

50th Anniversary — Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

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1,000-LB HOIST WEIGHS ONLY 30 LB

It's as easy as that to carry and hang

KELLER Air Hoist

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VARIABLE SPEED with fingertip control—spots loads accurately.

CAN'T BURN OUT from stalling. Not affected by dust and fumes. Maintenance costs are negligible!

Spotting heavy parts on a planer table

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KELLER

Pneumatic Tools

KELLER TOOL CO., GRAND HAVEN, MICH.

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DATA FILE

(BEGINS ON PAGE 167)

its use in hydraulic systems, speed reducers, air compressors, electric motors, hydraulic turbines, bearing systems, etc. A chart shows grades and uses, physical properties. Standard Oil Co. (Ind.)

343 **The Why, What and How of Lubricants** — This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.

344 **Lubricant Data Book**—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricants requirements of equipment in 25 major industries. Lubriplate Div., Fiske Bros. Refining Co.

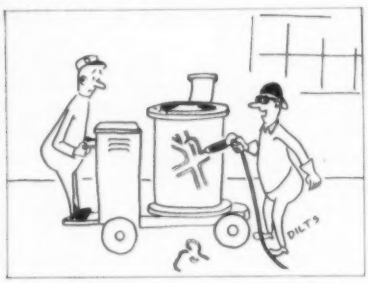
345 **Viscosity of Fluids**—The larger significance of viscosity is discussed in Nos. 5 and 6, Vol. 36 of Lubrication, a technical publication. Illustrates simplest conception of streamline flow between two surfaces having relative motion. Shows how viscosity is measured. The Texas Co.

346 **Diesels, Their Fuels and Lubricants** —This 46-pp book gives practical information on diesel engines, covering their history and economics as well as design characteristics and operating principles. Classification of diesels according to their speed is explained. Sinclair Refining Co.

DUST CONTROL

347 **Dust Control**—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

348 **Wet Method Dust Collection** — Besides presenting company's line of Multi-Wash dust collectors, dewatering tanks and pumps, 22-pp Bulletin 510 explains advantages of wet method of dust control, discusses both simple installations and those requiring additional equipment. Covers in detail the widely used Senior collector, the Junior collector for single function operations, settling and dewatering equipment. Claude B. Schneible Co.

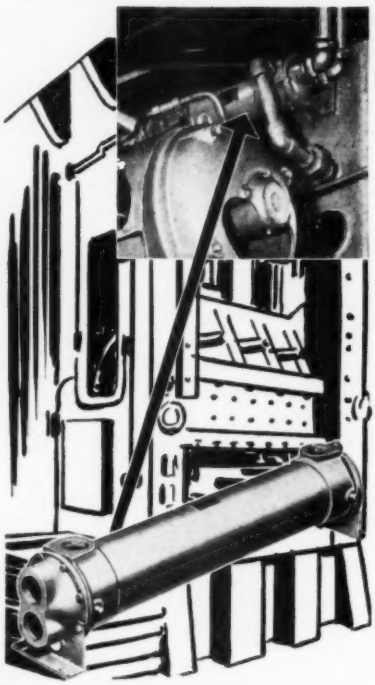


"Then, when you get to the heat treating section, turn left."

349 **Dust Recovery** — **"Engineered Efficiency in Dust Collection and Recovery,"** 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

350 **Dust Control Technology** — Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through

CONTROL HYDRAULIC FLUID TEMPERATURES!



THERE ARE 132 STOCK YOUNG HEAT EXCHANGERS TO ASSURE OPTIMUM COOLING

Young standardized shell and tube heat exchangers are quality-built to control fluid temperatures and protect costly hydraulic equipment. For example, tubes are braised to tube sheets which, in turn, are braised to the shell to eliminate leakage between hydraulic fluid and coolant. Tube and baffle spacing are engineered to provide maximum heat transfer with minimum pressure drop. Immediate shipments can be made from stock. Catalog sent upon request.

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Heat Transfer Products for Automotive and Industrial Applications.

Young Quality

Heating, Cooling, and Air Conditioning Products for Home and Industry.

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Factories at Racine, Wisconsin, and Mattoon, Illinois

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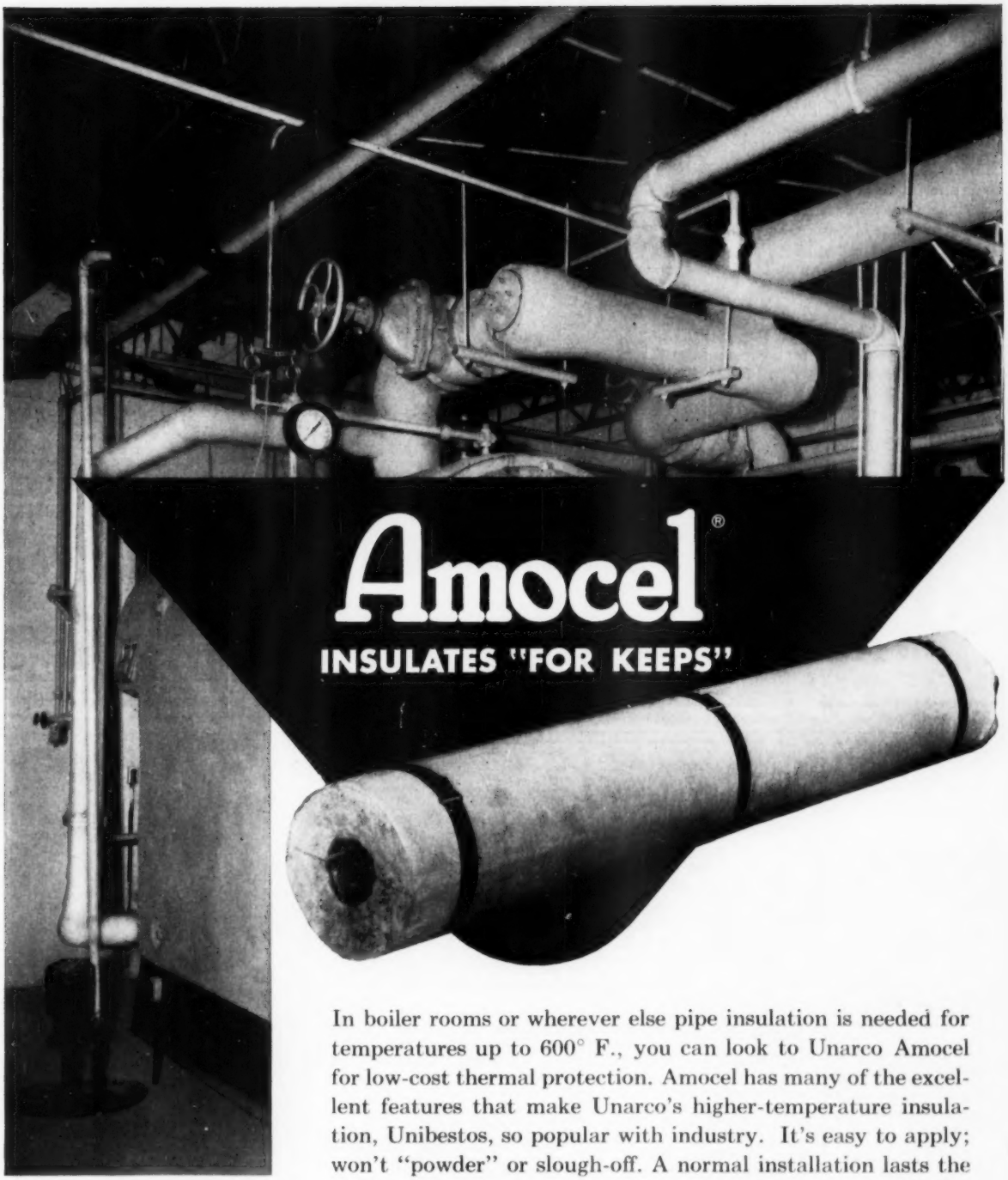

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INSULATES "FOR KEEPS"

In boiler rooms or wherever else pipe insulation is needed for temperatures up to 600° F., you can look to Unarco Amocel for low-cost thermal protection. Amocel has many of the excellent features that make Unarco's higher-temperature insulation, Unibestos, so popular with industry. It's easy to apply; won't "powder" or slough-off. A normal installation lasts the lifetime of equipment or building. Phone your nearby Unarco Warehousing Distributor for Amocel from stock. Or write us for your Distributor's name and free copy of Bulletin 76-109.

UNARCO

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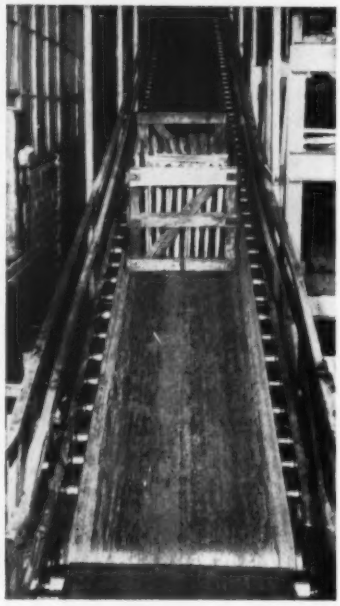
For heavy-duty elevating and conveying service

Standard Rexall Belting was developed by Imperial to resist the wear of abrasive materials . . . such as heavy metal castings, stampings, metal scrap, metal parts and heavy-laden boxes and crates.

The base of Standard Rexall is heavy-duty tight-woven silver duck. Plies are double-stitched with interlocking stitches which positively prevent ply separation. Special impregnation makes the belt extremely tough and rugged. It's low co-efficient of friction is ideal for slider bed and deflection service . . . less power required, less side-thrust.

Write for complete data and case histories.

Imperial BELTING CO.
1759 S. Kilbourn Ave., Chicago 23, Ill.



At Westinghouse Electric Co.'s Mansfield, Ohio plant this 210'x32"x4-ply Standard Rexall Belt handles pressed steel parts weighing 600 lbs. per crate, spaced 4 ft. apart. 20° incline. Even in this rough service, this Imperial belt will last five years or longer.

For more facts circle 634 on Reply Card

Why not **DO** *Something about Dust and Fumes?*

Protect Health and Profits in Your Plant with

Schmieg CENTRI MERGE DUST and FUME Eliminators

Available in capacities to handle air cleaning jobs—large or small—singly or in batteries.

30,000 CFM arrester—in a large grey iron foundry removes dirt and dust from shake-out stations, sand handling and conditioning system.

400 CFM to 2500 CFM exhausts dust and fumes from isolated grinding or buffing jacks—self-contained, complete with fan motor and drive.

THE best AIR PURGE is CENTRI MERGE

When you have a Schmieg Centri-Merge conditioning unit, designed and engineered for your specific needs, your dust and fume problem is banished once for all. Because Centri-Merge is always dependable, requiring no shutdown during working hours for cleaning or routine maintenance.

Centri-Merge units are used in widely divergent industries, in plants where all kinds of metal working operations are performed, in the chemical industry where purified air is of vital importance.

Centri-Merge operates on a simple principle. It collects pollution in the air, carries it along on a swirling cascade of water to an underwater trap where it is easily disposable as sludge.

Simple installation to occupy a minimum of floor space, maximum savings in low maintenance costs, assurance of years of trouble-free operation, in many cases a reduction in heating expense where re-circulation of air is possible. You can't buy better air cleaning equipment.

Do something about dust and fumes in your plant. Call in Schmieg engineers to develop a unit ideally suited to your needs. Do it today.

Schmieg INDUSTRIES INC.
Engineers & Manufacturers
P. O. BOX 4701 • DETROIT 34, MICHIGAN

For more facts circle 639 on Reply Card

DATA FILE

(BEGINS ON PAGE 167)

Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Pangborn Corp.

351 Manual of Exhaust Hood Design—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. American Air Filter Co., Inc.

352 Dust Collectors — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

353 Tubular Dust Fillers—Advantages, uses and design of tubular dust filters are given in Bulletin 24-D. Presents both single compartment and automatic continuous multi-compartment units. Describes bag shaker mechanism, dust discharge valve, dust hoppers. Ruemelin Mfg. Co.

INSULATION, REFRACTORIES

354 Heat Insulation—This 8-pp booklet on hydrous calcium silicate insulation is illustrated with graphs, tables and drawings showing numerous ways this insulation is used in industrial and commercial projects for temperatures up to 1200 F. Kaylo Div., Owens-Illinois Glass Co.

355 Pipe Insulation—Form 76-102 is a small folder stressing efficiency and economy of Amocel, a lightweight asbestos pipe insulation for temperatures to 650 F. Discusses its low thermal conductivity.

FINGERTIP CONTROL

Revolvator Go-Getter — telescopic straddle type lift truck — a bear for work in crowded areas, narrow aisles. Fully automatic — extraordinarily maneuverable 200° turning arc — 2500 lb. capacity — very slight operator training necessary. Write for full details of this and many other models.

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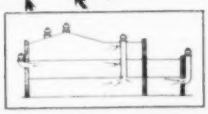
MUCKLE VENTS

chase out foul, wet air!

- Good looking
- Fit any roof
- Easy to install
- Motor out of line of air flow — for better performance in moisture filled air.



Muckle

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Some Territories Open For Sales Representatives

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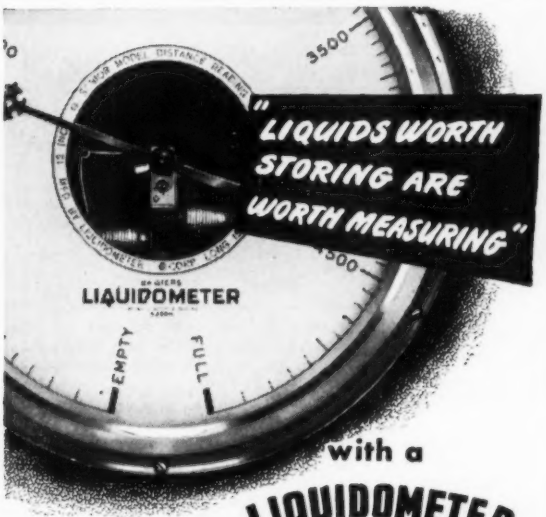

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LIQUIDOMETER Tank Gauge

- FOR GAUGING LIQUIDS OF ALL KINDS
- 100% AUTOMATIC
- APPROVED BY UNDERWRITERS' LABORATORIES

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THE LIQUIDOMETER CORP.
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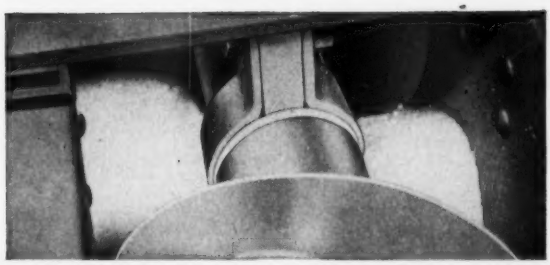

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Maintenance-Free SCREW CONVEYOR BEARINGS

1. No Lubrication — ever

Arguto bearings are self-lubricating for life of bearing. This means no maintenance.

2. Abrasion Resistance

Arguto bearings handle coke, cement, and cocoa as readily as cotton-seed meal, coal, and carbon black.

3. Silent Operation — No Squeal

Run full capacity at top speed — you can't make Arguto bearings squeal.

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Arguto bearings produce their own lubricating film. There is never any excess oil, so are used for grains, sugar, and many other foods and chemicals where purity is essential.

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You can install Arguto bearings even in hard to get at inaccessible places and forget them for years.

6. Easy to install

Just slip bearing into the hanger and tighten the strap or U bolt. That's all. Trough end bearings also available.

7. Easy to order

Five minutes with Arguto Catalog #210 and you can place your order—or send sample bearing identified with your name, address, etc. Quick delivery.

ARGUTO CATALOG #210 is your reference book to eliminate screw conveyor bearing trouble. Also contains complete section on Arguto Conveyor Roll Bearings and Engineering Data.

Write today for Catalog #210

Bearing orders will be filled promptly.

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20 years without a drink

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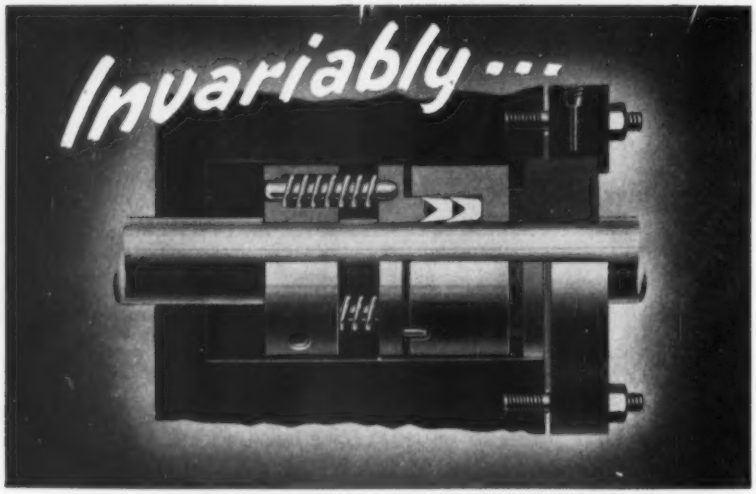

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ROTATES WITH THE SHAFT
for long dependable service

WHERE ....ECONOMICAL OPERATION IS DESIRED
....OPERATING CONDITIONS ARE HAZARDOUS
....LOSS OF COSTLY FLUIDS MUST BE PREVENTED
....COMPLETE AND PERFECT SEALING REQUIRED

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DURAMETALLIC CORPORATION
KALAMAZOO MICHIGAN

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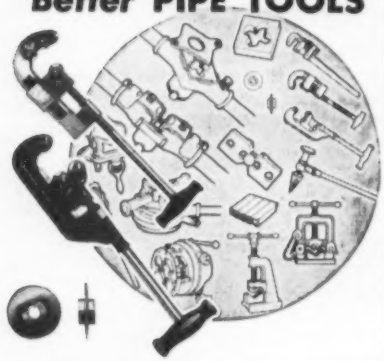
ARMSTRONG BROS.
Better PIPE TOOLS



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"ARMSTRONG BROS." Three wheel and Standard wheel and roller Pipe Cutters are quality cutters throughout . . . built to give years of good service.

"ARMSTRONG BROS." drop forged Pipe Cutters are built for lifetime service with 1-piece drop forged steel heat treated body and a replaceable hardened steel nut to take up the wear and thrust of handle screw. Used either as 1-wheel (with 2 roller) or 3-wheel (for close quarters).

"ARMSTRONG BROS." Knife Blade Cutter Wheels are machined from special alloy tool steel properly heat treated. They cut rapidly and easily, hold their keen edge.

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"The Tool Holder People"
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WISSCO
METAL PROCESSING BELTS
for every industrial processing need

Fabricated in steel or stainless steel in various weaves and constructions to operate efficiently and dependably from sub-zero temperatures up to 2100° F. Try us on your next order.

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CFI 1179
WISSCO BELTS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

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DATA FILE

(BEGINS ON PAGE 167)

high mechanical strength in relation to its weight. Union Asbestos & Rubber Co.

356 One-Coat Insulation — This 32-pp booklet describes company's Type D insulation, a sprayed-on coating for surfaces with temperature range from —40 to 300 F. Tells how one application of this coating not only insulates but also waterproofs, rustproofs, deadens sound, prevents condensation and resists fire. Tells how to apply. Insul-Mastic Corp. of America.

357 Rugged Refractories—Form 5120 is a 12-pp illustrated booklet explaining characteristics of several high quality refractories and telling what each is best suited for. Not an ordering book, covers silicon carbide types, electric furnace mullites, electrically fused alumina refractories and fused cast refractories, discussing their heat resistance, heat conductivity, chemical inertness, resistance to abrasion, spalling, thermal shock. The Carborundum Co.

BOILERS, GENERATORS

358 How Much for Steam — Here's a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb, using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.

359 Re-Circulation Steam Generator — Here's a 6-pp folder introducing a controlled re-circulation steam generator, describing its developments and uses. Combustion Engineering-Superheater, Inc.

"Sure, it was only an inch of water when I started on the break, but, Chief, you got to have some confidence."

360 Steam Generators—Twenty-pp Bulletin SB43, 20 pp, describes company's VL factory assembled generators combining 2-drum water-tube boiler, integral water cooled furnace, brick work, insulation and steel casing. A large cutaway illustration shows design details, and gas travel, circulation and furnace interior are also pictured. Use of the generator with various fuels and firing arrangements is covered, dimensions included. Erie City Iron Works.

361 Shop-Assembled Boiler — Sixteen-pp Bulletin G-76, completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. Capacities, dimensions given. The Babcock & Wilcox Co.

362 Packaged Steam Generators — This new 16-pp booklet on steam generators is profusely illustrated in color, providing photos, cut-away and schematic drawings and describing in detail the construction and operating principles. Explains induced draft, dry steam, four-pass downdraft design, 5 sq ft of heating surface per Bhp,

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ASK FOR FOLDER 535Z TODAY!

You Can Solve Your Problems With

VIKING ROTARY PUMPS Cedar Falls, Iowa

THE ORIGINAL "GEAR-WITHIN-A-GEAR" ROTARY PUMP

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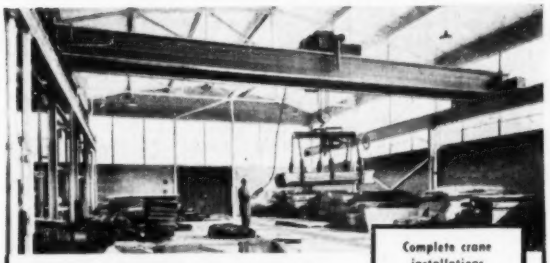

Repeat Installations are MANY!

When a business grows, it is natural to specify more of the equipment that has served well and contributed to that growth. This is the reason why expansion plans of so many firms include Abell-Howe Cranes, ordered again and again by previous users on the strength of thoroughly satisfactory past performance . . . For economical and truly serviceable overhead handling equipment, large or small, you cannot buy better.

Complete crane installations Job Engineered and manufactured by **ABELL-HOWE** are certain to SATISFY . . . INVESTMENTWISE and PERFORMANCEWISE

The Abell-Howe line includes a wide range of motorized and hand operated cranes, runways, monorails, electric hoists, storage racks and accessories.

Your inquiries are invited. Ask for catalog C-114

ABELL-HOWE CO. 53 W. JACKSON BLVD. CHICAGO 4, ILLINOIS

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Use Self-Dumping Containers

Save 50% Labor-Time with

ROURA Self-Dumping HOPPERS

SIMPLE – SAFE – SPEEDY MATERIAL HANDLING

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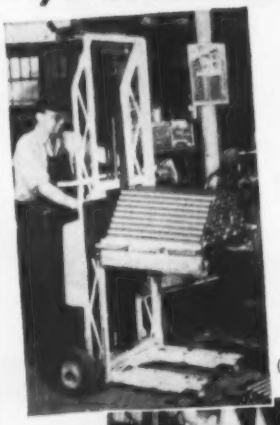

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(BEGINS ON PAGE 167)

flexibility of operation, and oil, gas and combination gas-oil burning equipment. Superior Combustion Industries, Inc.

VIBRATION, SOUND CONTROL

363 Engineered Vibration Control—Bulletin 104 presents spring, cork and rubber mountings, discussing advantages of each and use alone or in combination. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co., Inc.

364 Simplified Isolation — A simplified method of machine isolation which utilizes pads and cement is described in this small folder. Explains how it reduces maintenance cost. The Felters Co.

365 Sound Facts—This little folder gives the ABC's of noise. Tells what it is, how it is measured, and how company's sound control installations work to reduce noise levels to comfort range. Illustrates and describes briefly: machinery enclosures; sound barriers, traps; sound proof rooms. Industrial Sound Control, Inc.

PACKINGS

366 Metallic Packing—This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, operates and is used. A. W. Chesterton Co.

367 Braided Rod Packing—This 8-pp bulletin outlines advantages of company's lattice-braid rod packing. Contains sectional drawings, showing their unique structure, illustrations of types available, tables of service recommendations, specification and reports from uses. The Garlock Packing Co.

368 Buyer's Guide on Packings—Twenty-pp Catalog PC-101 brings together all material on company's Palmetto packings and includes data on packing for liquid pistons on inside-packed piston pumps. Greene, Tweed & Co.

OTHER EQUIPMENT

369 Hints on Babbitting Practice — In outlying basic steps for the prevention of common bearing failures, Bulletin 146, a little 16-pp booklet, covers everything from the choice of metal for a particular bearing application through the correct pouring practice to in-service maintenance. Proper lubrication, a maintenance schedule, and operation at correct speed and load are discussed. Federated Metals Div., American Smelting and Refining Co.

370 Tough and Flexible—Information is offered on Dynaprene cord, designed for durability and resistance to abrasion and cutting. Tells other advantages of this flexible, flame retardant cord. Whitney Blake Co.

371 Fundamentals of Hydraulics—Technical Buletin B-4 is a 44-pp guidebook covering essential information on hydraulic systems, maintenance, trouble-shooting and selection of proper fluids. Besides offering well-organized reference data for plant engineers, this book is suggested as a training manual for maintenance personnel. It features phantom and cutaway drawings showing functions of basic types of valves, pumps, hydraulic motors, torque converters. Sun Oil Co.

372 Fluid Power Circuits—The "Circuit Rider" is a 32-pp pocket-size manual presenting a discussion of basic designs in fluid power circuits together with drawings. Covers air, hydraulic and combination circuits, includes illustrations of JIC symbols. In preparing this manual, company has endeavored to provide a down-to-earth explanation of representative types of fluid power circuits and to show

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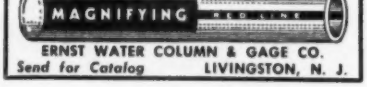

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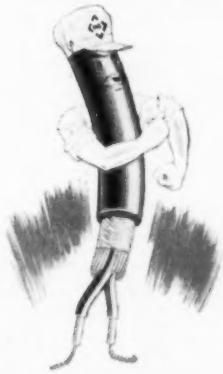

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DATA FILE

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the many possibilities afforded through the use of different types of circuit designs. Logansport Machine Co.

373 Hose and Tubing—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

374 Steam Atomizing Oil Burners—Sixteen-pp illustrated Bulletin 21 describes steam atomizing oil burners and auxiliary equipment for use with heavy oil or tar in boilers, stills, dryers and other furnaces, where steam or compressed air is available for atomizing the oil. Discusses steam and oil control valves. National Airoil Burner Co., Inc.

375 Dermatitis Prevention Program—"The Control of Dermatitis in Industry" is a 32-pp booklet on prevention of the skin diseases. Presents a program for providing personal cleanliness, protecting skin areas, preventing clothing contamination, guarding against special hazards. Lists conditions to be checked to determine cause of dermatitis. A 6-pp chart covering a wide range of industries lists various working conditions and types of dermatitis prevalent, and suggests preventive measures. West Disinfecting Co.

376 To Keep Wire Rope at Work—Form 3547 is an 82-pp handbook titled "Here's How To Keep Your Wire Rope Working," and filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Divs., American Chain & Cable Co., Inc.

377 Neoprene Goes to Work — Eight-pp Bulletin A-18 discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.

378 Magnetic Pipeline Traps—Bulletin B-203 describes magnetic pipeline traps for sanitary and standard applications. These permanent (non-electric) traps are designed to remove tramp iron from liquid flow lines and afford protection to processing equipment. Typical trap installation data given. Eriez Mfg. Co.

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379 Elevated Steel Tanks—Welded steel tanks with ellipsoidal bottoms and roofs are presented in this 24-pp booklet as an economical means of increasing plant water storage capacity, maintaining uniform pressure. Chicago Bridge & Iron Co.

380 Dry Chemical Extinguishers — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.

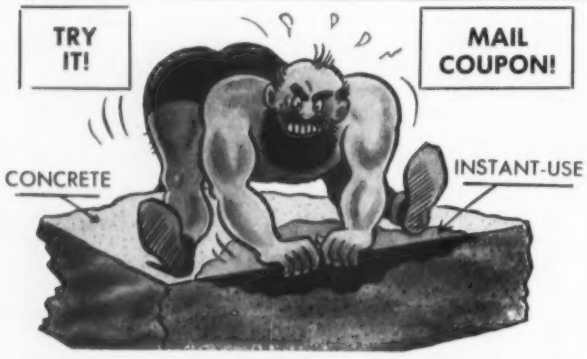
381 Chemical Cleaning Service—Reduced maintenance costs and outage time are among advantages of company's chemical cleaning service for steam equipment and water lines discussed in this 8-pp bulletin. Before-and-after photos show some actual cleaning jobs and case histories are given. Dowell Inc.

382 Glare Absorbing Glass—This catalog describes Coolite glass, designed to trap and absorb much of the sun's heat and to filter out annoying glare. Tells how conditioned natural illumination helps reduce operating costs and is easy to maintain. Mississippi Glass Co.

383 Self-Dumping Hoppers — Literature describing easily-operated hoppers is available. Tells how these hoppers are designed to fit standard fork or platform lift trucks for handling of wet or dry, hot or cold bulky materials. Roura Iron Works, Inc.

384 Socket Wrenches—This catalog presents a new line of socket wrenches of modern design offering both strength and compactness and available in a wide range of sizes. Fairmont Tool & Forging, Inc.

385 To Keep Out Moisture—Vents designed for easy installation on any roof to keep out wet, foul air are described in this literature. Muckle Manufacturing Co.



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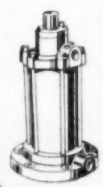

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metallizing cuts tank maintenance ...extends life

This 20-year old tank, used by a St. Louis brewery for boiler feed water supply, had become so badly scaled that it seemed ready for the scrap heap. Instead it was metallized with a .008" coating of pure aluminum, after being cleaned by grit blasting. Job was done by the St. Louis Metallizing Co. between 6 P.M. one Friday night and 6 P.M. the following Sunday, during a plant shut-down. This tank is now good for another 15 years, at least.

Boiler feed water tank shown encrusted with rust and mineral deposits before metallizing.

Feed water tank being metallized after preparation by grit blasting.

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*Reg. U. S. Pat. Off.

See other examples of metallizing for corrosion protection illustrated in our 8 page Bulletin in your Sweet's Plant Engineering File—Section 7a/Me.

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In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD., Chobham near Woking, England

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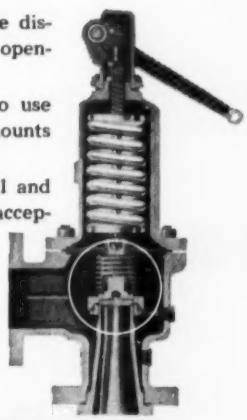

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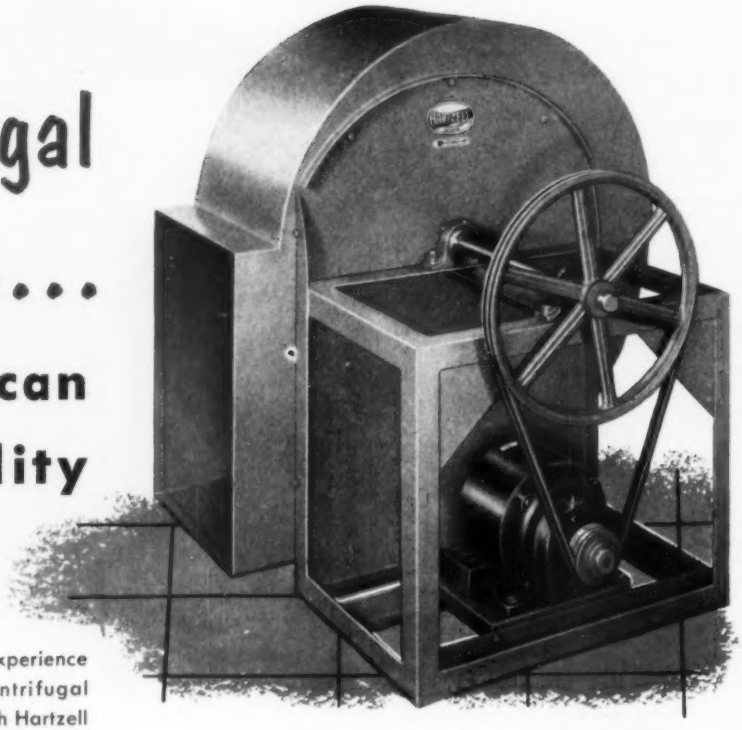

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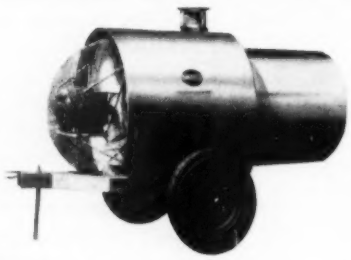

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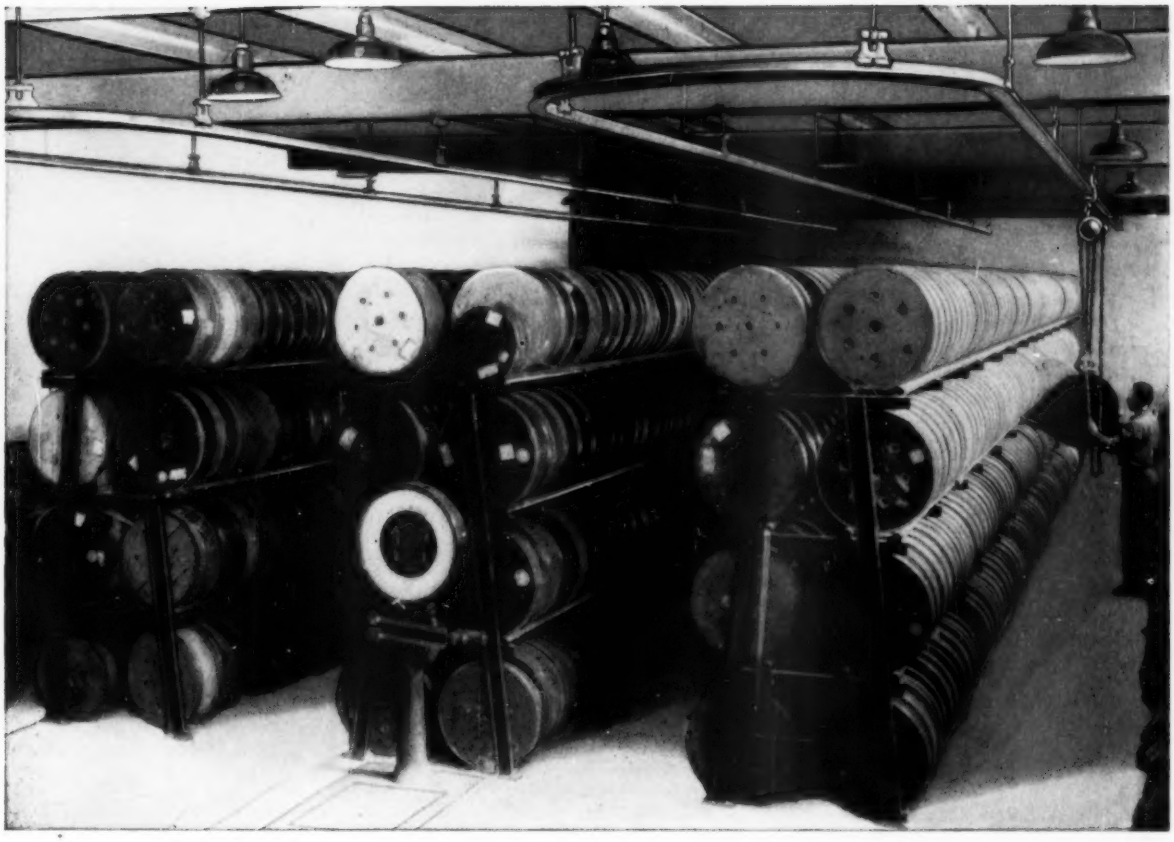

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Plant Engineering

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Volume 7, No. 2 Circulation of this issue 34,219